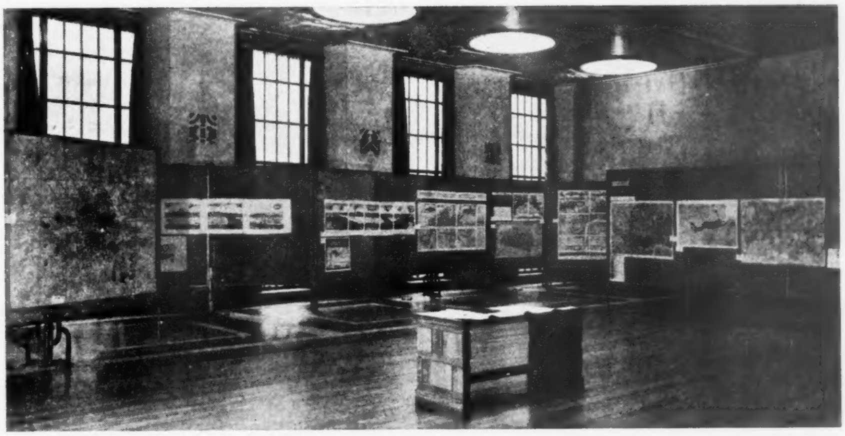

The London Maps Exhibition in the Henry Florence Hall

THE JOURNAL OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

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CONTENTS

Journal

SCIENCE AND ARCHITECTURAL EDUCATION

Most of this JOURNAL is filled with the first report of the Architectural Science Group's Education Committee on *The Place of Science in Architectural Education*, a matter of sufficient importance to justify the almost exclusive possession of a whole JOURNAL in discussion of this one subject.

The Architectural Science Group was formed before Christmas, 1939, and was thus one of the first, perhaps the first body, in our sphere of interest to concern itself with the long-term problems of wartime, which we now call " reconstruction " problems.

The group's constitution into Planning Economics and Sociology Committees was described in the JOURNAL of 18 November 1940. Through these committees it was proposed to study and report on scientific developments that are applicable to building and the use of scientific method in building. It was apparent, however, at the group's inaugural meeting that it would be illogical, and indeed a challenging insincerity, to consider " changes " or " reforms " in building and to omit consideration of the only means by which these technical changes could be handled intelligently and beneficially, namely, through the creation of a scientifically trained and science-conscious profession of architects ; a profession intelligently aware of the full implications of science considered not only as a laboratory affair but as method of thought and action. Hence the formation, at the start, of this fourth, or perhaps first, committee whose minds have been directed on to the intimate, stimulating and indeed dangerous problem of architectural education.

The A.S.G. have been aware that to discuss science in education apart from all the other sides of an architect's training opens the door to a charge of special pleading. Those who read the report must avoid this as earnestly as the group has endeavoured to do. A nutrition expert who detects the absence of Vitamin B in a people's diet, and who after research suggests means for making good the deficiency, does not because of this special recommendation advocate the exclusion from diet of all the other vitamins—nor here need it be thought that a special report directing attention to ways in which one very generally recognised deficiency can be made good is a denial of all the other values of architecture and the formative elements of those values to be found in a properly balanced architectural education.

It must be emphasised that this is a *first* report. No one can claim the absolute authority to speak with finality. The report is here to be read, absorbed, discussed and criticised, not merely to wrap 20,000 printed words in a million words of talk, but so that ways may be found to act on whatever recommendations here survive the searching analysis which publication is intended to facilitate.

B

REPLANNING LONDON

THE PRESIDENT AT THE ROYAL INSTITUTION

On Thursday, 29 May, the President lectured at the Royal Institution on the *Replanning of London*,* a lecture to which the Maps Exhibition at present being held in the R.I.B.A. is in a sense a supplement. The old question, Can we afford to replan on a large scale? had now, Mr. Ansell said, been changed to Can we afford not to replan? There were more regrets for past economies than past extravagances. "There was no economy comparable with a really breath-taking extravagance."

The main part of the lecture, after a brief historical survey, was an analysis of the position here and now—the legal and social problems of compensation and betterment and land acquisition; the administrative and executive difficulties of planning a city subdivided into semi-autonomous local authorities; complexity of the initial surveys which must precede planning; the location of industry and the planning of London traffic.

The President referred particularly to Lord Reith's initiative in asking both the City and the L.C.C. to prepare general planning schemes for submission to him in a few months' time. There must, he said, be complete liaison between City and L.C.C. and he urged that a single *ad hoc* planning department would best secure this, and hoped that once the general plans had been prepared a unified body would be formed to accomplish the planning aims of both authorities. Behind this executive body would be a London Planning Council of men and women who would broadly represent all the interests involved. Behind the London Planning Council would be the National Planning Authority, responsible to a Ministry or given Ministerial status.

At the conclusion of a section in which he discussed various major planning proposals such as South Bank schemes, railway reorganisation, etc., Mr. Ansell questioned, would anyone dare to include such sweeping schemes for reform in a plan unless he had behind him a powerful statutory body such as the proposed Planning Council would be.

The general outline of the plan should be decided before legislation. The plan must not depend upon the extent and amount of bomb destruction; timid half-hearted planning would get us nowhere. In London the London Planning Council would determine the kind of "main plan" that the metropolis should have. For a time it would be the hardest worked body in the kingdom. It would aim at London being a beautiful city as well as a convenient one, a city whose plan was not settled by police, firemen, motorists, sewage engineers, railway companies and so on and then tossed over to architects to make what they could of it.

Mr. Ansell spoke at length on the complexity of the preliminary survey work and described some of the work already done by the L.C.C., examples of which are on exhibition at the R.I.B.A. But first, he emphasised, clear guidance on the matter of land ownership and the public acquisition of land and buildings is wanted and until it has been given no planning could start. He foresaw that the Uthwatt Committee would indicate the lines on which new legislation would be needed to alter drastically the present privileges and rights of land ownership. The report of the Committee might well prove to be one of the most important documents in the whole of Britain's history.

In discussing the location of industry, with which, of course, was tied up the "location" of almost every individual in the country, Mr. Ansell said that there must be no compulsion on any of us to live here or there beyond that exercised by economic and natural causes. We are not fighting the war to lose our freedom of choice in the kind of life we want to live.

*This paper will be published in the Proceedings of the Royal Institution in due course. A long report was published in *The Builder*, 6 June, 1941.

ESSENTIAL WORK (BUILDING AND CIVIL ENGINEERING) ORDER

Details have now been published of the Essential Work (Building and Civil Engineering) Order which has been made to give the Government wide powers of control over labour to speed up the building of aerodromes, factories and other building works of national importance.

The Order can be considered in conjunction with the recent official pronouncements that production in the building industry has declined not only in relation to pre-war total production, which is understandable since a large part of the man-power of the industry left to enter other occupations, but that also per-man production has declined.

Labour on scheduled works is controlled by limiting the right of an employee to leave his job and of an employer to dismiss a worker, minimum time-rates of wages are guaranteed, and action is made possible under Regulation 58A of the Defence (General) Regulations, 1939, in cases of absenteeism, unpunctuality, failure to comply with lawful orders, and behaviour impeding production.

The Minister is empowered to schedule any particular undertaking and also any building site. All employees, which includes, of course, professional employees, excepting members of the armed forces and of the women's auxiliary services, are included in the Order, which also gives power to compel any worker to undertake "services outside his usual occupation . . . when work is not available in his usual occupation."

A COMMISSION ON THE FUTURE OF THE LONDON CITY CHURCHES

The President has been appointed a member of a Commission which is being set up by the Bishop of London to consider the future of the City churches.

The chairman is to be Lord Merriman and among the other members are the Lord Mayor and representatives of the Church of England in London.

MR. HIORNS RETIRES FROM THE L.C.C.: MR. FORSHAW TAKES OVER

Mr. F. R. Hiorns [*F.*], having reached the age limit for his appointment, is retiring from the post of Architect to the London County Council and Superintending Architect of Metropolitan Buildings, which he has held for the past two years, and Mr. J. H. Forshaw [*F.*] has been appointed as his successor.

Mr. Hiorns retires after nearly forty years in the service of the Council. Mr. Forshaw came to the Council from the Architects' Department of the Miners' Welfare Fund in the spring of 1939.

NATIONAL BUILDINGS RECORD, SCOTTISH COUNCIL

A Scottish Council of the National Buildings Record has been set up in Edinburgh under the chairmanship of the Marquis of Bute. The duties of the Scottish Council are similar to those described in the article on the work and constitution of the National Buildings Record in England, published in the May JOURNAL. Among the members of the Council are Mr. T. F. MacLennan [*F.*], President of the R.I.A.S., Mr. Reginald Fairlie [*F.*], Mr. F. C. Mears [*F.*], Mr. Ian Lindsay, Lord Hamilton of Dalzell, Mr. J. S. Richardson, Inspector of Ancient Monuments, Mr. Stanley Cursitor, Mr. Innes of Learney, Dr. Mackay Mackenzie, and Dr. Baird Smith. The Secretary of the Scottish Council is Mr. George Scott-Moncrieff.

The Scottish Council wishes to know of drawings of buildings in Scotland made by architectural students. Those who can help by telling the Council of drawings are asked to write to the Secretary, 54, Manor Place, Edinburgh, 3 (Tel.: 22202).

A.A. PRESIDENT

Mr. Arthur W. Kenyon [*F.*] has been elected president of the Architectural Association.

BIRTHDAY HONOUR

Mr. E. G. G. BAX [*F.*] has been awarded the O.B.E.

THE PLACE OF SCIENCE IN ARCHITECTURAL EDUCATION

The First Report of the Education Committee of the Architectural Science Group of the R.I.B.A. Research Board

CONTENTS

PREFACE

The Architectural Science Group was established "to study and report on scientific developments that are applicable to building and on the use of scientific method in building." At an early stage it was agreed that an important issue with which the Group must deal was the scientific education of the architect. Accordingly, an Education Committee was set up with the following terms of reference :—

"To consider the position of the architect in relation to the scientific aspects of his profession and to make recommendations regarding the extent to which and the methods by which science may be given a suitable place in his education."

Although the Committee have only completed the first stages of their investigation, the results already indicate in an impressive manner the important part which science is likely to play in the future development of architecture and building. The idea that marked changes in technical practice may result from the application of science already finds general acceptance. What is less readily appreciated is that science is likely to be of considerable value to the architect in helping to solve problems in the larger fields of planning and design and in the professional and industrial relationships of the architect.

In present circumstances a comprehensive statement covering these many aspects could only be prepared with difficulty, but the Committee hope to embody a reasonably complete statement in a short series of reports, forming at least a basis for further discussion within the profession. Subject to considerations which may arise later, this series will consist of :—

The First Report, now submitted, upon the educational changes necessary to ensure that architectural students will be equipped with an adequate knowledge and appreciation of science in relation more particularly to the technical problems of building.

The Second Report, which will be devoted mainly to the subject of Construction. In this the Committee will indicate what improvements can be achieved in the treatment of this important subject when considered on a scientific basis.

The Third Report will embody the results of an investigation into the part which science may play in elucidating the building needs of the client and the community, and into the changes in the architectural curriculum which may be called for in consequence.

The conduct of extensive preliminary investigations into all these matters has been impossible under present circumstances ; hence the Committee feel that they have been fortunate in being able to draw upon a fund of knowledge and experience, gained in recent years in scientific research and in architectural and building schools. Their thanks are due to certain witnesses and to members of other committees of the Group, who have commented upon the interim statements of the Committee. At later stages they hope to make even fuller use of this valuable assistance.

Discussions have been proceeding throughout the period during which the Committee has been at work, regarding the relations between the various groups of which the building industry is made up and regarding post-war developments in building policy. Only brief references have been made to these discussions in this Report, since their outcome cannot yet be foreseen. Moreover, the Committee's aim has been to consider the more fundamental aspects, and to embody their conclusions in educational principles which should apply in all circumstances.

The Committee have, however, given much thought to difficulties which schools may experience in acting upon their proposals. They hope that they have developed the proposals in sufficient detail to assist materially in meeting these difficulties. They consider it vital that these difficulties should be quickly disposed of, since they are convinced that the adoption of the proposals will lead to the establishment of compact and efficient courses in which the available time is used economically and effectively at all stages.

The Committee are aware of the dangers of over-emphasis where only one aspect of a broad educational curriculum receives detailed consideration. They hope, however, that their full statement of the case for science, embodied in the complete series of Reports, will assure the schools and the profession generally that the Committee have paid due regard to other aspects of the architectural curriculum. They believe that their proposals should lead ultimately to a strengthening of that architectural knowledge and skill upon which the achievements of the profession must at all times be based.

ALISTER G. MACDONALD
(Chairman of the Co-ordinating Committee).

RICHARD SHEPPARD
(Chairman of the Education Committee).

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PART ONE.—SCIENCE IN ARCHITECTURE AND BUILDING

I. Science in Modern Building

(1) In all countries building depends upon the efforts of many individuals gathered into numerous and varied professional and occupational groups. In this country these groups include the architect, surveyor, consulting specialist, builder and contractor, sub-contractor, builders' merchant, clerk of works, manager, foreman, craftsman and labourer. The practical co-ordination of the work of all these groups has depended in the past upon an established series of techniques and relationships, embodied partly in building byelaws, specifications and codes of practice, but mainly in common traditions of design and craftsmanship.

(2) These traditions and relationships have never been static, but changes have usually taken place gradually, causing only mild upheavals. Recently, however, this relatively stable state has been seriously affected by changes of an industrial, economic and social character. These changes have not only had reactions upon the materials and processes utilised in building but also upon architectural practice, by reason chiefly of demands for better housing standards and for improved architectural provision to accommodate a more complete range of communal activities. These developments have given rise to architectural and building problems of considerable difficulty and complexity. Some of these problems have received little attention from a scientific angle. Some of them will be considered by other Committees of the Group, following which it may be possible to extend the statement upon educational changes to cover these aspects. Meanwhile the Committee propose to limit their investigations to aspects of building in which scientific knowledge and scientific investigations have already made substantial contributions to technical progress.

(3) The investigation of the technical problems of building on an extensive scale by scientific methods is comparatively new. As a result of its intensive application in this country during the last twenty years, the scientific basis of building practice can be more completely stated than has previously been possible. The investigators require great knowledge and specialised technique for such work, but fortunately its fruits can be applied by architects and building technicians with the aid of a scientific knowledge much more general. None the less it will be seen that the problem of improving the scientific training of the personnel engaged in the different sections of building is both substantial and urgent and should receive early and methodical consideration. It will be obvious, however, that while the professional and technical improvements which are desired may be helped forward by improved methods of education and training, progress will depend mainly upon the establishment of improved practices in building itself.

(4) One of the weakest links in the present situation is to be found in the casual relations between building research and building practice. In some compactly organised industries the important stages of development between the issue of research results and their application in full-scale production are more or less fully thought out and organised. No such arrangements, however, exist in building, and the progressive development of technical practice is equally neglected, being influenced at present mainly by the interplay of conflicting vested interests. The control of sech a situation by outworn traditional methods is impossible. It calls for greater utilisation of scientific knowledge and method, and for more definite and effective co-operation between the profession and the industry in these matters.

(5) Along these lines an improved technique and a more resilient tradition in building practice could be established, based upon a combination of scientific research and methodical technical development. This would carry architecture and building to higher levels of achievement, and do much to satisfy the increasing demands which the community will make upon their services in the future.

II. Science and Construction

(6) Since the practice of building depends upon the co-operation of many groups, possessing varying knowledge and skill, agreement regarding technical practices is essential. To some extent common practices also find a place in the building byelaws, but, even in their revised form, the statement there given is incomplete, and aims at control rather than at providing technical information. The recent extension of standard specifications and codes of practice is welcome, but still leaves large parts of the field untouched.

(7) It is therefore interesting to find that in the educational field the subject of Construction, as developed in architectural and technical schools and colleges, has provided a comprehensive statement of building practice, and has interpreted the traditional practices of building in terms which have been widely understood and used. This suggests that the need for some such comprehensive subject, or grouping of subjects, dealing broadly with the technical practices of building, will continue, even if a more scientific approach to these practical problems is adopted.

(8) Experience suggests, however, that, to be fully effective, such teaching must be progressive and responsive to changing ideas. There has, however, never been any organised power inherent in the teaching body by which it could introduce new ideas, let alone hope to reform the practices of which it gave information. In fact new methods or ideas could not generally be taught until they had received support from the profession and the industry. Added to which the educational machinery necessary for the production of syllabuses, textbooks and examinations has always made revision slow and difficult.

(9) The Committee believe that an attempt should be made to establish certain broad principles upon which the future development of building practice might be based. This would be of great value to teachers, enabling them to lessen their dependence upon a great mass of detail, largely unrelated, to re-group the contents of the subjects about these principles, and thus develop the instruction in a more systematic and scientific manner. This, together with a greater freedom in the treatment of new ideas, would go far to revitalise the teaching and to increase its contribution to the solution of practical problems.

(10) Some use has always been made of scientific ideas in teaching the advanced technical subjects. This facilitates the development of the scientific treatment as now proposed. The same cannot be said, however, of the subject of Construction or of the treatment of building materials usually associated with it. These have been the least responsive of the technical subjects to the incorporation of scientific ideas. The Committee, believing that a change is eminently desirable, will, therefore, devote their Second Report mainly to a consideration of Construction starting from a scientific basis.

III. The Architect and Science

(11) The technical and social changes referred to above are bound to affect the position and functions of the architect. Those which are outside the control of either the profession or the industry, such as the effect of transport improvements, the siting of industry or changes in social customs, affect him only as a part of a larger organisation. Changes resulting from technological developments may, however, affect him directly as, for example, by the tendency to multiply specialists unnecessarily in the professional field.

(12) The Committee have not attempted to enquire into the likely nature of such professional changes, but, as a basis for their discussions, have assumed that architects will continue to occupy a key position in building. Thus they are at present the sole interpreters of the wishes of the client. The client may be an individual, or an organised group such as a civic or national

authority. The term "client" may here be used to cover the demands of the community in general upon the services of architecture and building. Thus there falls to architects in the first place the task of putting the demands of the client into explicit form. In the second place they are responsible for embodying in their designs and specifications the clients' demands, so that the whole of the machinery may be set in motion by which buildings are actually erected.

(13) Viewed in this way it will be seen that these relations between the architect and the client, and between the architect and the constructor, are fundamental. The Committee believe that if they are investigated scientifically they should lead to a clearer and more methodical statement of the community's demands upon architecture and building and to progressive improvements in the professional and technical ability to satisfy them. They propose to treat the educational aspects of these general ideas in greater detail in a Third Report.

(14) In the architectural profession the Committee believe that the problems of the future call for a much greater acquaintance with science than has been considered sufficient in the past. In fact they believe that only in this way will the architect be able to deal adequately with the technical problems of the future. Moreover, as the Committee hope to show in these Reports, the scientific method may ultimately assist in solving some of the more fundamental problems of architecture.

(15) A survey of scientific applications in building shows that they have been drawn mainly from the physical sciences. There is now, however, a strong tendency to apply scientific methods in the broader aspects of architecture, town planning and related topics. This is particularly true in connection with economic and social conditions, where scientific methods are gradually yielding results which should presently be of practical use to the architect. These developments must eventually affect some of the larger problems of planning and design. Hence it is clear that architecture must be influenced in the long run by the full range of scientific ideas.

(16) The fundamental step, therefore, in the present advocacy is to secure recognition within the profession that *science is of general application in architecture and building*. This does not mean that every architect must become a scientist in the academic sense, but he should be able to recognise where scientific ideas are involved and to make use of them. Moreover, possessing a background of scientific knowledge he will be in a position to appreciate and to utilise the results of scientific investigation and be better able to judge rightly between the competing claims of alternative schemes submitted by specialists and consultants.

(17) These, therefore, constitute the major aims to be considered by the Committee. To achieve them it will not be sufficient merely to add a little instruction in science subjects to the architectural curriculum. The knowledge of science must be adequate and, in addition, the nature of scientific method must be understood and utilised both in architectural study and practice. The advantages to be derived from such an approach to architectural problems are considerable and the Committee hope to explain them more completely in the full set of Reports. This is likely to be reinforced by other Reports of the Group.

(18) Finally the Committee believe that if the architectural profession now decides to go forward with the educational developments outlined in these Reports, they will give encouragement and direction to similar developments in the associated professions and occupations, where the need is equally pressing. The opportunity thus offered to the profession to give a lead to the building industry in this sense is one which is worthy of very serious consideration.

PART TWO.—SCIENCE IN ARCHITECTURAL EDUCATION

IV. Framework of the Educational Scheme

(20) To facilitate discussion the proposals of the Committee have been worked out against an educational framework similar to that which now exists in most architectural schools. This should enable the schools both to appreciate the true significance of the changes proposed and to adjust their courses with the least possible disturbance. On the other hand, the Committee do not wish to convey the impression that they think this framework should permanently retain in detail the form in which they now utilise it.

(21) Among the current arrangements of courses for architectural students, the following types are readily distinguishable:

(a) The five-year full-time course which may lead—
either to (i) a degree of a university,
or to (ii) a diploma of a university or school,
and (iii) in the case of the recognised schools, to exemption from the R.I.B.A. Final Examination.

(b) The three-year full-time course which may lead—
to (i) a diploma of a university or school,
and (ii) in the case of the recognised schools, to exemption from the R.I.B.A. Intermediate Examination.

(c) The part-time course, which offers to those already engaged in some form of architectural employment a preparation for the Intermediate Examination and the Final Examination of the R.I.B.A. In a few cases recognition is given to part-time courses carrying with them exemption from the Intermediate Examination.

(22) Within the three-fold classification outlined above there exists much variety. The Report discusses the question of science solely in relation to a normal five-year full-time course in the first place. Indications are then given of the adjustments required to adapt the proposals to other types of courses (see paragraph 72).

(23) In the normal five-year full-time course there are three major stages, more or less generally recognised. The first is that of the student's entry to the architectural course; at this stage consideration must be given to his previous education and to the educational qualifications demanded of him. The second stage covers the first three years and will be referred to in this Report as the Intermediate Course. The third stage covers the Fourth and Fifth Years and will be referred to as the Final course. These stages have the added advantage that they correspond to the stages at which important professional qualifying examinations are usually taken, viz., acceptance as a Probationer of the R.I.B.A. and the Intermediate and Final Examinations of the same body.

V. Standards of Entry to Architectural Courses

(24) The educational requirements generally expected on entrance to the profession may be considered under two heads, viz., entry to the profession and entry into one or other of the several types of educational course set out above.

(25) At present the qualifications required of a Probationer by the R.I.B.A. may be any one of the following:—

(*a*) Any recognised School Certificate.
(*b*) Any recognised Higher School Certificate.
(*c*) An extrance examination of a recognised Architectural School.
(*d*) The Preliminary Examinations of either the Institution of Civil Engineers or of the Chartered Surveyors' Institution.
(*e*) Any other examinations (some of which are named in the official list) satisfactory to the Board of Architectural Education.

(26) Apart from the statement that "All applicants must produce evidence of a good general education satisfactory to the Council . . . .," and the requirement that "all applicants must submit drawings showing that they possess some knowledge of drawing . . . .," no hint is given in the official publications of the nature of the schooling to be taken to prepare for entry to an architectural course. There are no references to subjects. In particular there are no references to either mathematics or science.

(27) With regard to the standards required on entry to full-time architectural courses, the requirement in the case of those students preparing to take a university degree is the matriculation examination of the University concerned or its equivalent. At present only a few universities require any mathematics and science for this group of students.

(28) Other full-time students, not preparing to take a degree, must take the entrance examination of the school or department concerned, or offer some equivalent. Again, in only a few cases do these entrance examinations require specifically a knowledge of mathematics and science.

(29) These remarks apply to part-time and full-time courses alike, and it may be added that generally the School Certificate examinations represent the minimum standard required. This standard corresponds to that required of Probationers. Thus, at present, the operative standard of entry into the profession is the School Certificate with no preferences indicated for any particular subjects, except drawing.

(30) Since no special requirements in science have yet been laid down and no advice given to students on the choice of subjects in their pre-professional education, it is not surprising that a very confused situation exists. Many students do indeed possess some knowledge of science, and a few may even have reached Higher School Certificate standard. Probably, however, a majority enter these courses knowing no science, and little effective use is made of the knowledge possessed by the remainder.

(31) The Committee consider that the position thus revealed is so serious that an attempt should be made to secure an immediate improvement. They therefore recommend that in future all students entering architectural courses should be expected to possess some knowledge of science and mathematics, and should be so advised in respect of their pre-professional education.

(32) Many practical difficulties must, however, be overcome before even this modest recommendation can come into full operation. One of these difficulties is that the range of subjects, both in the School Certificate and the Higher School Certificate Examinations, is a wide one. Moreover, the factors affecting the choice, in the case of both schools and pupils, are so varied that it is difficult to ensure that any large group of students, drawn from all parts of the country, shall have qualified in more than one or two specified subjects other than English and a foreign language.

(33) For the secondary and other day schools from which these students come, the special requirements of the various professional institutions set in some instances an almost insoluble problem. The difficulties facing these schools would certainly be reduced and the value of the preparation provided for these students would be enhanced, if the professional institutions requiring a knowledge of science could agree upon the subjects and standards required. The recent movement among some of the engineering institutions, which has resulted in the establishment of The Engineering Joint Examination Board, is commendable if only for this reason.*

(34) Such preliminary examinations not only give some indication of the nature of the pre-professional education favoured by the profession, but are also a great convenience for those students who, for various reasons, have not obtained exempting certificates while still at day school. If the R.I.B.A. decided to establish such a Preliminary Examination it should not be difficult to avoid adding unduly to the specialised demands made upon the day schools, to which reference has been made above.

(35) One of the present obstacles facing teachers of architecture is that students on entry either possess no knowledge of science or else their qualifications are so varied in subject and standard as to offer no consistent basis on which to plan the instruction. The Committee therefore consider that the time has arrived when definite requirements in science and mathematics should be laid down.

(36) If it were possible of general achievement the Committee think that a requirement that all students should have carried the subjects of Mathematics, Physics and Chemistry to School Certificate standard at least, would provide an excellent basis. For reasons set out above, however, the Committee think that for some time to come it will be impossible to achieve such a standard universally and they therefore propose one which ought to be attainable generally and quickly, and which offers a reasonable working basis.

The recommendation of the Committee is that students should be required to have reached at least School Certificate standard in Mathematics and in one further subject chosen from : Physics, Physics with Chemistry, or General Science.

(37) Chemistry would certainly be desirable as an additional subject, but it has been assumed that for the present it will not be generally available. Hence the illustrative syllabuses set out in the Appendix assume that the students have not taken elementary Chemistry before entry. Generally it may be said that if, as time goes on, higher entrance standards become possible, then it should not be difficult to take immediate advantage of these by making adjustments in the architectural course. The cases of well-qualified individual students can always be met by exempting them from those sections of the work which they may have already covered.

(38) With regard to entry into Probationership the Committee would urge that those entering the profession by this door should also be expected to offer both mathematics and a science subject to School Certificate standard.

VI. Science and Technology in Architectural Courses

(39) A rapid survey of the curricula of architectural schools in this and other countries shows that there is much variation in the present methods of teaching science and the related technical subjects. Separate and methodical instruction in science seems to be given in only a few schools in this country. The proportion is higher elsewhere. All schools give instruction in what may be called the technical subjects, but the underlying scientific principles often receive scant treatment.

(40) In those schools where definite and separate instruction in science is being given, the arrangements may be fairly considered in two distinct groups. In the first group the necessary scientific knowledge is arranged in one comprehensive subject, commonly called "Building Science." Here prominence is given, at all stages, to those sections of science which are of special importance to the students. The method is comparatively new in architectural schools, but it is evident that in the hands of competent teachers it successfully interests the students, while the fact that illustrations and experimental examples are drawn largely from building ensures the closest possible co-ordination between the scientific and technical aspects. Care is needed, especially in the early stages, to avoid giving merely a superficial knowledge of the scientific ideas. The work should be arranged in a sequence and over such a range as will ensure that the student acquires an adequate knowledge of the fundamental sciences and systematic habits of thought. The details of the instruction in the later stages of this subject have not been fully worked out in any one school, but most sections have been covered somewhere, while the Committee are assured that the problems thus raised can be solved along the lines laid down in this Report. This development of the subject will be of great educational value, offering ample opportunities to the schools for discussion and experiment.

(41) In the second group, the method followed is older, and has grown largely out of the conditions under which some of these architectural schools were established. Thus, where the architectural school or department forms part of a university or technical college, the architectural students frequently attend

* The Engineering Joint Examination Board has been established recently "for the purpose of examining, by means of tests in general education, such candidates for studentships and other grades as the participating Institutions may refer to it." The participating Institutions are the Civil, Electrical, Marine, Mechanical, Municipal and County and the Structural Engineers, the Naval Architects and the Royal Aeronautical Society.

general classes provided by other faculties or departments, in such subjects as Mathematics, Physics, Mechanics or Chemistry. Points in favour of this method are that the fundamental sciences are taught by specialists ; the students have access to better equipped laboratories than might otherwise be possible ; and the contacts of architectural with other students may broaden vision. On the other hand, the architectural students may miss much of the benefit of the wider training in science through failure to realise at the time the significance or relevance of the material. Time-table arrangements sometimes cause difficulty unless a very large proportion of the first-year curriculum is given to mathematics, physics and chemistry, as it is in the case of such courses as engineering.

(42) Co-ordination is of outstanding importance. The Committee think that the advantages of the improved instruction in science will be largely dissipated if it does not exercise a marked influence on the technical subjects of the course. In other professional fields, such as medicine and engineering, the ultimate effect of co-ordinating the instruction in science with the technical practices of the profession has been to establish important fields of applied science. In architecture and building, although progress is being made, such a development lies in the future. The Committee believe, however, that the present investigations, together with the discussions and experiments to which they should give rise, will lead to substantial progress in these respects. The Reports of the Committee will include a number of suggestions concerning the methods by which the necessary co-ordination between science and technology may be secured.

(43) Influenced no doubt, by the requirements of the professional examinations British schools, all appear to give elementary instruction in mechanics as applied to structural problems, and in the properties and uses of building materials. The requirements are, however, somewhat elementary and limited in scope. From a scientific point of view the treatment of both these subjects is at present inadequate.

(44) A variety of advanced technical instruction is generally included, under such titles as "Theoretical Construction," "Steel and Reinforced Concrete," "Hygiene," "Acoustics," etc. Such instruction is usually given by specialist lecturers, who are often more concerned with the technical aspects than with the scientific principles which may be involved. Moreover, even in those schools where earlier instruction has been given in Physics and Chemistry, it is difficult to find instances in which this instruction is utilised to form a scientific basis for the advanced technical instruction. In other words the co-ordination is often weak. Further general weaknesses arise out of the comparative neglect of experimental work and of the subject of Mathematics.* Here again the examination requirements are relatively elementary and too limited in scope to provide adequately for modern demands.

(45) Summing up, it cannot be said that instruction in science in these courses has anywhere been adequately developed. Useful educational experience has, however, been gained and there is undoubtedly a growing realisation of the part which science might play in the architectural curriculum.

(46) In considering the extension of this instruction in architectural courses, it will be realised that there are great differences between the several sciences in the extent and availability of the knowledge developed in them. In some relevant sciences the knowledge is not yet in a form suitable for incorporation in architectural curricula. Opportunities therefore exist for pioneer and original work, first in separating and defining the material which has a clear bearing upon architecture and building, and second in arranging it for use in educational courses. In this Report the Committee have concerned themselves principally with those sections of science—mainly physics and chemistry—in which both the knowledge and the educational experience is in a form which can be readily and effectively incorporated in the curriculum. This knowledge has a direct and obvious bearing upon the materials of building and methods of construction and upon the equipment and utilisation of buildings.

* Suggestions regarding experimental work are given in paragraphs 75-77, and regarding Mathematics in paragraph 70.

(47) The Committee's proposals for the treatment of the instruction in science outlined in this Report are embodied in two illustrative and alternative schemes, A and B. These schemes, which have been set out in some detail, embody approximately the same range and standards of scientific knowledge, but they represent two contrasted methods of approach. They do not by any means exhaust the possibilities of variation within the limits set by the general proposals of the Committee, but it is hoped that they cover the major differences which may exist in the circumstances of the schools.

VII. Science in the Intermediate Course : Scheme A—Building Science

(48) In this Scheme the instruction in science depends upon the full development of the subject of Building Science over the three years of the Intermediate Course. A complete statement of the aims and methods of this subject would take more space than can be given to it in this Report, but general notes are given below and the illustrative syllabuses given in the Appendix may be consulted for further detail. In reading these syllabuses it will be noted that, in addition to arranging the items in a proper sequence, they are also grouped broadly into sections. The object of such groupings is to give emphasis to important divisions of the subject and thus to focus the attention of the student and increase his interest. (See also the descriptive note in par. 40). They also help in developing the knowledge of science in a balanced manner throughout, since each section receives attention in each year of the course. Considerable variety is possible both in the sequence of the items and in the broad groupings adopted, so that no arrangement can claim to be final.

(49) In the illustrative syllabuses the subject-matter has been divided into three sections in each year, each section being given a short descriptive title. The first section, entitled "Materials," includes the scientific ideas necessary to understand certain building problems related to the structure and use of materials, including the effects of moisture on materials, and problems of weathering. These items, suitably arranged, provide an interesting introductory course in Physics. Similarly problems connected with the use of limes, plasters and cements, and the corrosion of metals, are utilised to form an introduction to Chemistry. Timber and certain other organic materials are also considered in this section, for which, even at an early stage, a knowledge of both physics and chemistry is required.

(50) The second section, entitled "Structures," deals almost exclusively with mechanics as applied to elementary problems in structural work. The section also covers those properties which are usually considered under the title of "Strength of Materials."

(51) The third section, entitled "Equipment," is probably the most comprehensive of the three. The basic science is almost entirely Physics and is really an extension of that taken in the first section of the subject. The sub-sections have been arranged to allow of an orderly development of this knowledge. In the Third Year these sub-sections include elementary problems arising in Heating and Ventilating, Lighting, Sound, Electrical Equipment, Sanitation and Fire Resistance.

(52) An outstanding feature of the method of teaching under Scheme A is that the requirements of the principle of co-ordination are achieved with comparative ease. By constantly giving illustrations from the technical background the teacher of Building Science interests the student and strengthens his feeling that effective use will be made of the knowledge he is acquiring. These illustrations should refer to technical practices which are within the immediate knowledge or experience of the student. As the student acquires further technical knowledge the references may be of a more substantial character, including even some elementary problems of technical design.

(53) Co-ordination of the instruction at this stage with that in the advanced technical subjects of the Final Course must also receive attention. Thus there should be a steady and suitable

development of scientific knowledge throughout the Intermediate Course, so that at the end the student may pass smoothly to the study of these advanced subjects, having a good scientific grounding and some knowledge of the technical aspects.

(54) Regarding time-table arrangements (see Appendix II), the Committee recognise that it would be unwise to speak too definitely, since they are concerned only with a section of the curriculum. They have, however, estimated the total times which would be required to carry out their proposals for the benefit of those planning the exact arrangements. The figures given are only approximate, since they will depend upon the thoroughness with which the scheme can be developed. They estimate that for the illustrative syllabuses given in Building Science a total of from 300 to 450 hours of instruction would be required. If, as is suggested, this work is spread over the three years of the Intermediate Course, this total gives an average of from 3 to $4\frac{1}{2}$ hours per week under normal term arrangements. Not more than half the time should be given to lectures and lecture-demonstrations, the remainder being given to experimental work in the laboratory and to tutorial work connected therewith.

(55) Under no circumstances should these teaching times be further cut in either Scheme A or Scheme B. Closely-knit schemes of the kind here discussed represent considerable economy of time as compared with other schemes consisting merely of subjects picked from various sources and not so intimately related.

The Committee therefore wish to emphasise that they are not suggesting that the schools should burden their courses with 300 to 450 hours of additional instruction. Much of what will be taught in this time is, in many cases, already covered, but in much less closely co-ordinated schemes. This also applies in Scheme B.

VIII. Science in the Intermediate Course: Scheme B—Physics and Chemistry

(56) Scheme A having been fully described, it should only be necessary, in describing the alternative Scheme B to call particular attention to the points in which the two differ. Under Scheme B instruction in science during the Intermediate course is given through the two subjects of Physics and Chemistry. Wherever possible this instruction should be given in special classes for the architectural students and spread over at least two years. This would have the additional advantage of allowing for more effective co-ordination between the instruction in science and the technical subjects in this scheme.

(57) The illustrative syllabuses in Physics and Chemistry give more emphasis than usual to sections of these subjects which are of value to students of architecture and building. This is achieved mainly by the way in which the items are grouped; this need not seriously disturb the normal treatment of the subject. Rather less attention might be given than is usual to the quantitative treatment of Chemistry. It is presumed that the treatment will include the usual amount of laboratory work.

(58) In Scheme B the main requirements of co-ordination have to be satisfied largely outside the science subjects. There are several alternative methods of arranging this. One method, which has been adopted in setting out the proposals in the Appendix, is to institute preparatory courses in Elementary Building Materials, Elementary Structures, and Elementary Equipment. These courses would extend over the three years of the Intermediate Course and cover the technical matter detailed in the Building Science syllabuses of Scheme A. They would run parallel with the science instruction during the first two years. Additional laboratory treatment of these applications of scientific knowledge in building will be necessary.

(59) Alternative arrangements for securing co-ordination could be devised. For example, some of the instruction in Physics and Chemistry might be given in the first year of the Intermediate Course; in the succeeding two years the remainder of the science instruction might then be given on the lines of Building Science. Another method would be to take the subject matter of the suggested three preparatory subjects (Elementary Building Materials, Elementary Structures and Elementary Equipment) along with the subject of Construction, allowing additional time in the latter subject for this purpose.

(60) These alternative methods are but examples of many variations which may be devised within the limits of the Committee's proposals. The Committee wish, however, that the proposals embodied in the two Schemes A and B, should stand out clearly as illustrating two distinct and contrasted methods of approach, leaving it to the schools to work out in detail such other variants on them as may meet their local requirements most effectively.

(61) For the illustrative syllabuses in Physics and Chemistry the time needed is estimated at from 200 to 300 hours. (See Appendix II). If, as suggested, the instruction is spread over the first two years of the Intermediate Course this total gives an average of from 3 to $4\frac{1}{2}$ hours per week under normal term arrangements. Not more than half of this time should be given to lectures and lecture-demonstrations, the remainder being given to experimental work in the laboratories and to tutorial work connected therewith. For the instruction dealing with the co-ordination of science with technology at least another 150 to 200 hours of instruction will be necessary. Again not more than half this time should be given to lecture work, suitable laboratory work occupying the remainder of the time. The distribution of this time from year to year may vary according to the manner in which the instruction is divided among the three main sections.

IX. Science and the Subjects of the Final Course

(62) Successful completion of the instruction in science by either Scheme A or Scheme B, should ensure to the architectural student a satisfactory knowledge of the groundwork of science. Moreover, if proper attention has been paid to co-ordination, the technical aspects of the student's studies will have benefited. In addition he should have acquired a general scientific outlook and mode of thought which will greatly enhance the value of his further studies. The conclusion of the Intermediate Course should therefore see him better prepared to study some of the specialised subjects of the Final Course than has previously been possible.

(63) In order to illustrate the study of the applied science subjects of the Final Course the Committee have prepared illustrative syllabuses. The subjects selected by the Committee and the proposed duration of study in each case is as follows:—

Acoustics and Sound Insulation (1 year).
Electrical Equipment and Installation (1 year).
Hygiene and Sanitation (1 year).
Heating and Ventilating (2 years).
Structural Practice and Design (2 years).

(64) The Committee recognise that other groupings of subjects and differently constructed syllabuses may prove equally effective and cover the technical material essential to the Final Course. They assume that the treatment of the subject of Construction will be adjusted so as to be complementary to the treatment of the specialised subjects. An improved approach to the teaching of Construction in future should in fact make it possible to bring the correlation of the students' advanced studies to a high state of efficiency. The Committee hope to give special attention to this problem in their next Report.

(65) Since these subjects are to be treated as applied sciences, purely descriptive lectures should be reduced to a minimum. Mathematical exposition and experimental treatment should be utilised wherever possible, and the knowledge of science should be methodically developed during the course to whatever standard is demanded by the scope of the subject. In each of these subjects the principal materials should be treated adequately, including the accepted methods for testing and for specification.

(66) Because it may be possible to carry these advanced studies to a higher standard than has previously been possible, it is suggested that the final year of each of these subjects should be optional. Certainly some students may have neither the capacity nor the desire to carry particular subjects forward to such an advanced stage. Moreover, the claims of other specialised

subjects of the Final Course, which lie outside the Committee's terms of reference, must be kept in mind.

(67) The general aim of these proposals is to equip the students so that, as architects, they may exercise properly their duties as advisers, supervisors, or even designers in these important subjects of building work and equipment. This should be possible even if a student does not complete more than, say, two of the optional final years. At the same time this provision of optional studies should facilitate and encourage that variety in qualification, and that degree of specialisation which the future seems likely to call for. In some cases these advanced subjects, or sections of them, may receive still further development in post-graduate courses.

(68) If an increasing number of architects become qualified to deal, in the fullest sense, with the modern demands of architecture in its scientific and technical aspects, it will go a long way to discourage any tendency towards the unnecessary multiplication of specialists in the professional field. It should also help to establish a more realistic basis of informed co-operation between the architect and such specialists as future developments show to be necessary.

(69) For the present purposes the subjects of Hygiene and Sanitation, Electrical Equipment and Installation and also Acoustics and Sound Insulation can be adequately covered in one year in the Final Course. The subjects of Heating and Ventilating and of Structural Practice and Design will each require two years study.

(70) It is usual to emphasise the value of Mathematics in the building sphere mainly in relation to structural theory, but some knowledge is essential for the effective understanding of science and its applications generally, even in the early stages. An illustrative syllabus in Mathematics has therefore been prepared with the needs of architectural students specially in mind. All students should study the subject for at least two years. It will be advantageous if those students who possess some mathematical ability, and especially those who are later to specialise in structural work, will spend a third year in consolidating their mathematical knowledge. It is estimated that a total of from 200 to 250 hours of instruction will be required.

(71) No references have been made under the head of Mathematics to the important subject of Practical Geometry. It is usual in architectural courses to treat this subject in relation rather to draughtsmanship than to calculation. It is intended, however, that full attention should be given in these courses to the uses of graphical methods in science under a number of heads. These applications call for the same ready grasp of the underlying principles of plane and projective geometry as are needed in other aspects of architectural study.

(72) It will be convenient to add here a brief note concerning the arrangement of the whole of the instruction covered by the Report in other than five-year full-time courses. Here the estimates of total hours should be useful in preparing other schemes. Thus, in shorter full-time courses or in part-time courses, if the same total times can be given to particular subjects there should be no difficulty in completing the work along the lines recommended. In the shorter three-year full-time courses it would appear advisable to complete the normal intermediate course as laid down, the advanced and final course studies being completed by part-time studies. In the case of part-time courses the instruction may have to be spread over more than three years in order to build up the necessary total of hours. It may be noted, however, that the part-time student who is fortunate enough to be employed in a well-organised office, will be acquiring familiarity with architectural procedure and with practical work on buildings and in workshops. Some economy of his time under instruction is thus achieved in comparison with the full-time student.

(73) The common aim of all these courses is to prepare the students for the qualifying examinations of the profession or for internal examinations conducted by the approved schools. These examinations therefore occupy a position of great importance in any considerable development of the architectural curriculum. The Committee believe that their proposals could be adopted without the necessity for revolutionary changes in the present schemes of examination. Substantial improvements in the subjects, the syllabuses and the standards of the examinations are clearly called for in the first place (see pars. 43 and 44), after which further developments could be accomplished on the basis of a steady and progressive improvement of detail running more or less parallel to the development of the proposals within the schools.

X. Staffing, Accommodation and Equipment

(74) The adoption of the Committee's proposals will eventually call for substantial developments in staffing. Major changes are clearly impossible under present conditions. There are in any case strong arguments in favour of a gradual introduction of the new proposals, since this will ease the burden of all problems of this nature and provide a more solid foundation for ultimate developments. There are, broadly, two alternative methods of training teachers for this work. The first is to assist existing teachers to extend and develop their present qualifications, which would involve helping science teachers to acquire some knowledge of building and helping teachers of architectural subjects to acquire some knowledge of science. The second method would involve the establishment of arrangements for training a new type of teacher. Architecture does not stand alone among the professions in its need for specially trained teachers to deal with the undergraduate student. As yet, however, no very definite proposals have been advanced in any quarter to meet this need. If a more definite scheme was established, then this is certainly a field in which it might operate successfully, for both the need and the scope for teachers with specific forms of training are considerable. Meanwhile the first method is always available and calls for the establishment of short courses of varying type to enable such men to extend their knowledge and training. Some experience has already been obtained in the development of this type of course. An extension of suitable facilities could no doubt be obtained by co-operation between the profession, the education authorities, the universities and the research bodies.

(75) Reference has been made to the fact that a common weakness in many schools at present is the absence of experimental and laboratory work. Experience in other fields of education supports the view that science teaching which does not include a considerable amount of laboratory work, and instruction concerning the materials and methods of construction, which includes no practical laboratory treatment of the materials themselves, does not in fact produce educational results commensurate with the time spent upon them. For effective instruction in science laboratory treatment is essential. Whether Scheme A or B is adopted the need is great for laboratories planned and equipped to meet the special needs of architectural students. No single development would so strongly and soundly affect the students' attitude towards scientific ideas.

(76) The Committee therefore suggest that early and serious attention be given to the question of laboratory accommodation and equipment. At present little laboratory provision is to be found in any of the architectural schools. The leeway to be made up is therefore considerable. The extent and nature of the new accommodation will depend partly upon the particular arrangement which is finally adopted for giving the instruction in science, and partly upon the extent to which greater use can be made of laboratory facilities already existing in other university faculties or technical college departments. Where the needs of architectural, building and other students are similar there is much to be said in favour of co-operative arrangements.

(77) Modern problems in the use of building materials demand something more than a knowledge gained solely from lectures, text-books and catalogues. Personal experience with the major materials at least is essential. This idea is inherent in the experimental methods advocated by the Committee. These methods require that actual specimens be brought into the lecture room, the studio and the laboratory. Thus accommodation is needed for display and storage so that a representative range

of materials may be classified and indexed for easy reference. These methods would not replace, but might well reinforce, other methods which have been advocated for enabling the full-time student to gain an intimate knowledge of materials, such as the acquirement of craft experience in workshops and on buildings.

XI. Educational Facilities for the Practising Architect

(78) The Committee are, of course, only concerned with the scientific aspects of education, but they would urge the establishment of better educational facilities for the practising architect. It is sometimes considered that his needs are met by the provision of occasional professional lectures, by the publication of a Journal and by library facilities permitting consultation of technical literature. But there are changes in architectural practice which cannot be adequately covered in this way. In particular the more important changes likely to result from scientific research are often not in a form suitable for embodiment immediately in undergraduate education. Such require that the profession should be widely informed and encouraged to discuss the problems of their application. The resulting clarification of the topics may then allow the new ideas to be embodied in the school courses.

(79) Moreover, as is well recognised in Medicine, substantial changes occur during a man's professional life. In architecture and building such changes have been marked and rapid in recent times, both in the demands made on architecture and building by society, and in the materials and techniques available for meeting them. It is therefore important to establish machinery to enable the practising architect to keep himself fully informed and competent. An immediate and urgent problem which might be dealt with on these lines arises out of the growing demands for planned post-war reconstruction.

(80) Post-graduate education is often taken to refer only to short periods of specialised study and research undertaken immediately after graduation. The Committee think that the term might usefully be made to cover all organised studies and researches undertaken by the qualified architect after he has entered into practice. Undergraduate education is a preparation for professional life, and, however thorough it may be, graduation cannot and should not be regarded as bringing education to a close. It is in professional life, coupled with further study, that the true extension of the architect's training is to be found.

(81) Experience has already been gained in the provision of refresher courses and post-graduate facilities for professional men. The provision may consist of short series of lectures, or of week-end or longer full-time courses or conferences. The co-operation of all scientific and professional bodies with similar aims, and the assistance of universities, education authorities, schools of architecture, technical colleges and schools of art should be enlisted. By these methods the difficulty of gathering together a sufficient number of qualified students would be largely overcome.

(82) For the more normal and established topics of architectural study, all that will be necessary will be arrangements enabling architects to attend the nearest architectural school for individual subjects. In a few cases subjects and examination syllabuses may have to be adjusted to meet the needs of these adult students. Extended provision of substantial scholarships, enabling practising architects to undertake special investigations or studies would be a valuable addition to this movement.

XII. The Principal Recommendations of the Committee

(83) The major suggestion put forward by the Committee is that science should be given a more prominent place in the education of the architect.

(84) It is likely that in the future many sciences will influence architecture by assisting in the more precise statement of the needs of the community which building has to serve, and also by showing how those needs may be more adequately satisfied. The Committee considered it advantageous, however, to deal in the present Report only with those sciences in which research has revealed indisputable facts of practical value in building, and which can be utilised in the educational field with relative ease. They hope to expand this treatment of science in later Reports.

(85) The Committee have come to feel that there is urgent need for co-operative arrangements between the profession, the building industry and scientific research, directed towards the establishment of broad principles of building technique and its progressive development in the future. To reap the full advantages of such developments they suggest that a general extension of scientific training among the personnel engaged in architecture and building is necessary.

(86) In the second part of the Report the Committee discuss the educational aspects in detail. They suggest that the student should be expected to enter the architectural course with some knowledge of science and mathematics. They make suggestions regarding the extent of the knowledge which may be asked for at present, but express the hope that this standard may be progressively improved.

(87) During the Intermediate Course this knowledge should be developed methodically so that at the end of this stage the student may be well prepared to study those specialised subjects of the Final Course which call for a foundation of scientific knowledge.

(88) To illustrate how these educational principles may be put into practice in the Intermediate Course, the Committee outline two alternative schemes of instruction in science. Scheme A includes the instruction in the comprehensive subject of Building Science, while Scheme B includes it mainly in the subjects of Physics and Chemistry.

(89) It is of very great importance to secure that the instruction in science has its proper influence upon the other subjects of the curriculum, particularly the technical subjects. The Committee suggest methods for achieving this co-ordination.

(90) They also think that considerable improvements should be possible in the scope and treatment of the subject of Construction, starting from a scientific basis. The Committee hope to consider the relevant problems later and to issue a separate Report.

(91) On the basis of the scientific studies developed in the Intermediate Course, the Committee outline a comprehensive series of applied science subjects which may be taken in the Final Course or as post-graduate subjects. These should make possible that variety and that specialisation in the qualifications of architects which the future seems likely to call for.

(92) The Committee emphasise the value of laboratory methods and suggest that the provision and utilisation of building science laboratories is a problem calling for immediate attention. The growing demand for a more scientific treatment of building materials will also necessitate some specially planned accommodation.

(93) Architects trained along these lines will expect to find the practice of architecture changing progressively during their professional career. The Committee therefore suggest that educational facilities should be established which would enable the practising architect to keep himself fully informed concerning modern changes in science and technology, and himself to take part in their development. Such methods might be utilised in the discussion of post-war problems.

(94) Throughout the Report emphasis has been placed upon the adoption of certain basic principles or ideas. There should therefore be many opportunities offered for individual initiative and ingenuity, which should ensure that resulting developments are soundly based upon expert enquiry and experience.

(95) The Committee believe that if these proposals find acceptance among the schools, and have the understanding support of the profession generally, they will open the way to educational and professional developments of a far-reaching and beneficial character.

APPENDIX I

Illustrative Syllabuses in Certain Subjects of the Final Course

INTERMEDIATE COURSE

1. Mathematics (2 or 3 years).

Scheme A.

2. Building Science (3 years).

Scheme B.

3. (*a*) Science—
   - (i) Physics (2 years).
   - (ii) Chemistry (2 years).

   (*b*) Co-ordination of Science with Technology—
   - (i) Elementary Materials
   - (ii) Elementary Structures
   - (iii) Elementary Equipment

   (3 years).

FINAL COURSE

4. Acoustics and Sound Insulation (1 year).
5. Electrical Equipment and Installation (1 year).
6. Hygiene and Sanitation (1 year).
7. Heating and Ventilating (2 years).
8. Structural Practice and Design (2 years).

Important Note.—The following syllabuses were prepared during the duscussions of the Committee in order to establish definite ideas concerning the scope and standard of the instruction. While the syllabuses are based to some extent upon existing syllabuses, they incorporate improvements and developments not yet in operation in their entirety in any school. Full development of the instruction along these lines may not therefore be possible, even in the strongest schools, for some time to come. Their adoption should in every case be subject to a consideration of the particular circumstances of the school. It is also important that the contents of the syllabuses be considered in relation to the time-estimates given in the Report. In practice the syllabuses could be more briefly expressed, but it was thought to be advantageous to leave them in this Report in their original form.

1. MATHEMATICS (2 or 3 years. See pars. 70 and 71).

Algebra.

Indices. Theory and use of logarithms, with calculations from practical formulæ.

Theory of quadratic equations.

Ratio, proportion and variation : with some practical examples and illustrated by graphs. Surface and volume of sphere. Similar figures ; areas of similar figures proportional to squares of their linear dimensions ; volumes of similar figures proportional to cubes of their linear dimensions.

Arithmetic and geometric progressions ; infinite geometric progression.

Binomial theorem for positive integral index and its use for other indices.

Trigonometry.

Compound angles, double-angle and half-angle formulæ.

Sums and differences as products, and *vice versa*.

Heights and distances, with examples from surveying problems.

Easy examples in identities, elimination, trigonometric equations.

Small angles ; practical examples.

Graphs.

In addition to those above :

Change of origin of co-ordinates.

$$y = ax_2 + b, \quad y = ax^2 + bx + c$$
$$x^2 + y^2 = r^2, \quad (x - a)^2 + (y - b)^2 = r^2,$$
$$y = \frac{Ax + B}{ax + b}$$
$$y = \sin x, \cos x, \tan x, \log_{10}x, 10^x$$

The ellipse as the orthogonal projection of a circle.

Straight line law, and a few examples on the determination of laws from data with practical examples.

Roots of equations $f(x) = 0$ by drawing a graph.

$f_1(x) = f_2(x)$ by drawing two graphs.

One or two simple examples on polar equations :

$$r + a \cos \theta, \quad r = a \sin \theta, \quad r = a \sec \theta, \quad r = c - a \cos \theta.$$

Statistical methods : Tabulation. Frequency distributions and their characteristics. Normal curve. Averages (mean, median and mode). Measures of dispersion. Index numbers. Graphical representation. Trends and fluctuations. Common errors in statistics.

Calculus :—Differentiation. The meaning of a differential coefficient as a gradient and as a rate of change. Differential coefficients of ax^n, $\sin(ax + b)$, $\cos(ax + b)$, and e^x and $\log x$. Sums, products, quotients. Integration.

Applications to maxima, minima, areas, volumes, mean and root-mean square values of a function, centres of gravity, and moments of inertia. Approximate integration. Guldinus's theorems, with applications to the mensuration of the cone, frustum of a cone, sphere, spherical cap and zone. The idea of a differential equation.

SCHEME A

2. BUILDING SCIENCE (see Section VII).

*First Year.**

I. *Materials.* (Includes the science underlying the use of constructional materials and their exposure in the fabric of buildings) :

Properties of matter. Solids, liquids, gases, semi-solids. Crystalline and amorphous solids. Allotropic forms.

Units and methods in physical measurements. Density, Specific gravity. Capillarity. Surface tension.

Porosity of building materials. Absorption of moisture. Determination of moisture content. Expansion and contraction of timber. Impervious materials. Function of dampproof courses.

Solvent action of water. Evaporation. Crystallisation. Deliquescence and efflorescence.

Chemical change. Oxidation of iron. Composition of air. Calcination of limestone. Slaking of lime.

Acids, alkalies, bases and salts.

Elements and compounds. Symbols, formulæ and equations.

II. *Structures.* (Includes the science underlying the structure of buildings and the strength of structural materials) :

Tensile and compressive stress. Strain. Hooke's Law. General ideas regarding strength, ductility and brittleness.

Voids in granular materials. Sieving and grading sands and aggregates. Reduction in volume on mixing mortars and concretes.

The composition and resolution of forces in one plane. The forces acting in simple framed structures with vertical loading : force diagrams.

Reactions of beams under vertical loading. Equilibrium of systems of non-concurrent forces in a loaded beam. Bending moment and shear force diagrams for freely supported beams and for cantilevers under concentrated loads.

Simple machines, friction, mechanical advantage, efficiency.

III. *Equipment.* (Includes the science underlying the equipment and occupancy of buildings) :

(*a*) *Heating and Ventilating.*

Expansion and contraction of materials with temperature. Boiling points and melting points. Measurement of heat. Heat units, calorie and British Thermal Unit.

Specific heat, Latent heat, Change of state. Ice. Alloys. Solders. Transfer of heat. Conduction, convection, radiation. Emission and absorption.

Humidity. Hygrometry. Condensation. Factors affecting bodily comfort in heating and ventilating.

(*b*) *Electricity.*

Electrical supply as a source of power. Effects of an electrical current (A.C. and D.C.) ; heating, magnetic and chemical. Illustrations from ammeters and volt-meters and primary batteries. Simple electrical circuit. Resistance, e.m.f., units. Ohm's Law.

(*c*) *Sanitation and Water Supply.*

Fluid and gaseous pressure. Boyle's law. Pumps and syphons. Simple mechanical and other appliances used in sanitation and water supply.

BUILDING SCIENCE (Second Year).

I. Materials.

Further work on porosity of building materials. Permeability. Measurement of porosity. Evaporation. Movement of moisture in walls.

Weathering effects due to frost action, crystallisation and acid attack. Problems arising from expansion and contraction of building materials due to change in moisture content and thermal expansion.

The laws of chemical combination. Measurement of gases. Atomic theory. Valency. Chemical calculations.

Properties, methods of use and testing of limes, Portland cement and gypsum plasters.

Paints and painting processes. Classification and tests of common pigments, vehicles and driers. Varnishes. Common paint defects. Reactions of painted surfaces. Corrosion of metals.

Structure of timber. Natural and kiln seasoning. Moisture content. Introduction to causes of decay. Fungal rot, dry rot. Methods of preservation.

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* In order that the statement of work may be complete, a number of elementary items appear in the First Year Sections. With well-qualified students these could no doubt be rapidly dealt with, or summarised in a revision of earlier work.

II. *Structures.*

Stress-strain diagrams, with particular reference to mild steel. Modulus of elasticity. Tests to failure. Working stresses; factor of safety. Specification and bye-law requirements.

Factors in the strength of concrete, aggregate grading, proportioning, mixing, placing and curing. Effect of jointing material on strength of brickwork and stonework.

Roof principals and framework generally, with vertical and simple inclined loads. Graphical methods of solution and introduction to methods by calculation. Riveted joints. Sections of tension members.

Mathematical and graphical determinations of shear force and bending moment diagrams for simply-supported spans: concentrated and distributed loads.

Simple theory of elastic bending, and the use of $M/I = f/y = E/R$ formulæ.

Short compression members; distribution of load in composite members, including reinforced concrete; non-axial loading and combined bending and direct thrust.

III. *Equipment.*

(*a*) *Heating and Ventilating.*

Heat emission from pipes and radiators. Heat input and loss from rooms. Calculations of heat required to maintain a room at a given temperature.

Introduction to the requirements of ventilation, and characteristics of the various methods adopted.

(*b*) *Lighting.*

Reflection and refraction of light. Prisms and lenses. Optical instruments in surveying; microscopes.

Illumination, intensity and measurement.

(*c*) *Sound.*

Propagation of sound: velocity; frequency. Hearing. Reflection; absorption; reverberation and echo. Introduction to transmission and insulation of sound in buildings.

(*d*) *Electricity.*

Units of electric power and energy; their relation to mechanical and heat units. Simple wattmeter and energy meters. Electromagnetic induction. Principle of the electric generator. Interaction of a current carrying conductor and a magnetic field. Electric motors.

(*e*) *Sanitation and Water Supply.*

Hard and soft waters. Simple tests of natural waters. Filtration. Water softening and other treatments.

Introduction to flow of water in pipes and channels and through orifices. Water meters.

BUILDING SCIENCE (Third Year).

I. *Materials.*

An outline of geological knowledge and methods with relation to the production of stones, slates, bricks, tiles, terra cotta, limes, cements, plasters and other building materials. The formation and characteristics of building sites.

General consideration of various external materials and finishes; bricks, natural stones, cast stones, terra cotta, rendered finishes. Selection, specification and testing of facing materials.

Resistance of particular materials to weathering; estimation of durability.

Treatment of roofs; solar radiations; protection from heat absorption and penetration. Problems of flat roofs, including use of asphalt.

Selection and specification of floor surfaces. Production of coloured and textured surfaces. Magnesium and oxychloride cements and other floor finishes. Testing for wearing qualities.

Durability of painted surfaces. Synthetic paints. Bitumen, asphaltic paints. Preservatives. Selection and specification of paint materials. Performance tests.

Further consideration of decay and preservation of timber. Properties, uses and tests of plywood, fibrous and other wall boards. Grading and specification of timber.

II. *Structures.*

Mathematical and graphical methods of determining shear, bending moment, slope and deflection diagrams for concentrated and distributed loads on simply supported single span girders. Distribution of shear over the cross-section of a beam. Design of steel and simple reinforced concrete beams.

Roof principals and articulated frames generally. Graphical and mathematical methods of analysis; method of sections; tension coefficients. Three dimensional problems; forces in members of derrick cranes and shear legs. Shoring. Scaffolding.

Long compression members axially loaded; Euler's, Rankine's and other formulæ.

Stability of piers, walls and buttresses subjected to non-axial loads and inclined thrusts.

Foundation problems, classification of sites. Mechanical properties of soils and rocks. Grillage foundations.

III. *Equipment.*

(*a*) *Heating and Ventilating.*

Convection and radiant heating systems. Low temperature radiation. Heat insulation. Introduction to refrigeration. Natural and mechanical methods of ventilation.

(*b*) *Lighting.*

Systems of interior lighting. Practical photometry. Colour, selective absorption and transmission. Effect of artificial lighting. Adequacy of daylight illumination.

(*c*) *Sound.*

Further work on sound reflection and absorption, transmission and insulation. Sound absorping materials. Acoustical treatment of simple rooms and small halls. Sound insulation methods.

(*d*) *Electricity.*

Alternating currents: frequency, phase difference, R.M.S. values. Effect of inductance: capacitance and resistance in simple circuits. Impedence. Power and power factor in A.C. circuits. Methods of measuring single and three-phase power.

(*e*) *Fire Resistance.*

Non-inflammability; incombustibility. B.S.S. and municipal requirements. Simple high temperature tests on brick, concrete, etc. Fire resistance of structural units. Introduction to fire prevention methods.

SCHEME B

3 (*a*) SCIENCE—(i) PHYSICS (see Section VIII).*

Properties of Matter.

Solids, liquids, gases, semi-solids. Crystalline and amorphous solids. Allotropic forms.

Units and methods in physical measurements. Density. Specific gravity. Capillarity. Surface tension. Gaseous pressure. Barometer. Boyle's law. Siphons and pumps.

Mechanics.

Composition and resolution of forces in one plane.

Moments. Couples. Centres of gravity.

Simple machines. Friction. Efficiency.

Young's Modulus.

Elasticity. Stress and strain, Hooke's Law.

The laws of motion. Weight and mass. Work and energy.

Moments of inertia in simple cases.

Periodic motion. Simple harmonic motion. The pendulum.

Gravitation.

Heat.

Measurement of temperature. Thermal expansion of solids, liquids and gases. Charle's law. Diffusion.

Calorimetry. Quantity of heat. Heat units. Specific heat.

Change of state. Melting points and boiling points.

Cooling curves. Solidification of alloys and of ice. Freezing mixtures. Refrigeration.

Vapour pressure. Humidity. Hygrometry. Evaporation and condensation. Simple kinetic theory.

Transference of heat. Convection. Conduction. Emission and absorption.

Sound.

Nature of sound. Hearing. Transmission of sound in various media. Velocity of sound. Experimental study of longitudinal and transversal vibration. Pitch. Resonance. Stationary waves in strings and air columns. Upper limits of audibility. Reflection. Absorption. Interference. Reverberation. Echo.

Light.

Propagation of light. Laws of reflection and refraction. Formation of images by reflection at plane and spherical surfaces. Refraction at plane and spherical surfaces and by prisms; minimum deviation. Formation of images by thin lenses. Optical instruments, surveying instruments, microscopes. Photometry, illumination. Colour, selective absorption and transmission, effect of artificial lighting on colour.

Electricity and Magnetism.

Elementary facts of magnetism. Magnetic fields. Lines of force.

Electrostatic induction. Potential. Capacity. Energy of charged conductor. Specific inductive capacity.

Magnetic effect of electric current. Field in solenoid and at centre of coil. Galvanometers. Ammeters. Ohm's law. Voltmeters, potentiometers, bridges.

* In order that the statement of the work may be complete, a number of elementary items appear in the early stages of both Physics and Chemistry. With well qualified students these could no doubt be rapidly dealt with, or summarised in a revision of earlier work.

Thermal effect of electric current. Measurement of temperature. Primary cells and accumulators.

A.C. and D.C. generators. Motors. Transformers.

Qualitative treatment of self-induction and oscillating electrical circuits. Simple descriptive treatment of electrical discharge, X-ray tubes, the cathode ray, oscillograph, thermionic valves.

3 (a). SCIENCE—(ii) CHEMISTRY (see Section VIII).*

Elements, compounds and mixtures. Chemical change. Symbols, formulæ and equations.

Composition of air. Oxygen. Oxidation. Oxygen and combustion. Nitrogen. Water vapour and humidity.

Solvent action of water. Evaporation. Crystallisation. Deliquescence and efflorescence. Composition of water. Hydrogen.

Calcium and limestones. Lime, slaked lime. Calcium hydroxide.

Acids, bases and salts. Alkales. Neutralisation.

The laws of chemical combination. Measurement of gases. Atomic theory and valency.

Carbon dioxide and carbonates. Hard and soft waters. Water softening. Washing soda. Simple tests of natural waters.

Combustion and respiration. Calcium carbide. Acetylene.

Allotropic forms of sulphur. Sulphides. Sulphuric acid. Sulphites and sulphates.

Carbon and coal. Distillation of coal. Coke. Coal gas. Ammonia gas. Water gas and producer gas. Practical distillation of petroleum.

The properties of the metals ; iron, copper, zinc, tin, lead, aluminium. Alloys : brasses and bronzes. Solders. Properties of oxides and salts ; aluminium oxide ; sodium carbonate, sulphate and chloride ; potassium salts ; magnesium carbonate, sulphate and chloride ; lead oxides, white lead ; iron oxides and sulphates. Silicon and silicates. The chemical constitution and properties of the important building materials : Portland and aluminous cements, gypsum plasters, clays and bricks, limes, magnesium oxychloride, pigments.

3 (b). CO-ORDINATION OF SCIENCE AND TECHNOLOGY (see Section VIII).

(i) Elementary Building Materials.
(ii) Elementary Structures.
(iii) Elementary Equipment.

These courses would extend over the three years of the Intermediate Course, and would each be conducted as one class with its appropriate laboratory periods. The syllabuses would cover the technical portions of the Building Science Syllabuses of Scheme A.

II. FINAL COURSE

4. ACOUSTICS AND SOUND INSULATION (Optional. See Section IX).

Revision of the preparatory work included in the Intermediate Course.

The nature and characteristics of sound. Hearing ; limits of audibility. Pitch. Loudness. Tone quality. Speech and music. Speed of sound. Echoes. Units for the measurement of sound. Experimental methods.

Reflection, interference and absorption of sound in rooms and halls. Absorption coefficients. Reverberation and reverberation formulæ. Reverberation effects in relation to various acoustical requirements. Resonance. Acoustics in the design of various interiors. The application of acoustical materials.

Transmission of sound in buildings. Air-borne and transmitted noises. The design and construction of buildings and interiors to reduce sound transmission. Insulation against noise and vibrations from mechanical equipment. Noise abatement.

5. ELECTRICAL EQUIPMENT AND INSTALLATION (Optional. See Section IX).

Revision of the preparatory work included in the Intermediate Course.

Conductors and insulators ; properties and suitabilities under varying conditions. Ohmmeters.

Distribution to consumers for lighting and power. 2- and 3-wire D.C. systems. 3- and 4-wire A.C. systems.

Internal distribution. Various systems of distribution and wiring for domestic and larger premises and for works. Earthing. Testing and acceptance of installation.

The transformer. Rotary and static convertors. The various types of conversion apparatus.

Switching, controlling and protection gear. Sub-station requirements.

Various types of A.C. and D.C. motors : their performance, characteristics and suitability for various types of load. Power factor improvement. Methods of power factor control.

Lighting. Various factors affecting a lighting scheme. Illumination calculations. Preparation of lighting schemes. Various types of lamps (including gas discharge lamps), their characteristics, efficiencies and suitability for various types of lighting schemes. Direct and indirect reflection methods, suitability to conditions of work.

Electrical heating. Thermal storage and other systems. Thermostatic control. Water heating for domestic purposes. Central and individual units.

Storage batteries. Lead-acid and alkaline types. Automatic emergency systems. House service plants. Stand-by requirements.

Methods of power and energy measurements. Tariffs. Methods of charging for bulk supply. Maximum demand and other methods.

Telephones. Automatic systems of intercommunication. Wiring for radio, sound and other projectors. Study of interference problems which may occur in buildings. Installation and maintenance.

Electric bells and fire alarm systems.

Electric clocks. Various control systems. Wiring precautions. Installation and maintenance.

Note.—In connection with all the foregoing installation details the Regulations of the Institution of Electrical Engineers should be referred to at appropriate points.

6. HYGIENE AND SANITATION (Optional. See Section XI).

Revision of the preparatory work included in the Intermediate Course.

Sanitary equipment in domestic, public, industrial and other buildings. Schemes of drainage. Removal of rain and subsoil waters. Methods of testing, inspecting and reporting on new or existing drainage work. Common defects.

Disposal of sewage from town and country houses, and from industrial premises. Sewage systems and sewage disposal. Collection and disposal of town refuse. Principles of salvage, incineration and controlled tipping.

Water supply. Physical and chemical characteristics of drinking water. Public and private sources of supply. Sources of pollution and methods of prevention. Purification, filtration, softening and other types of treatment.

Hydraulics as applied in domestic and public water supply, and in water-borne drainage and sewage systems. Pumps for lifting water from wells and streams. Further work on the flow of water in pipes and channels. Water meters.

The various systems of heating and ventilating buildings of all types. Standards of ventilation. Air conditioning. Comparison of fuels and types of main heating units.

General survey of sanitary regulations. Public Health Acts, model and local byelaws. Housing and Town Planning Acts. Sources of air pollution. Smoke abatement.

7. HEATING AND VENTILATING (See Section IX).

Fourth Year.

Revision of the preparatory work included in the Intermediate Course.

General study of heating systems. High and low pressure hot water systems ; gravity, accelerated and closed high temperature systems. High pressure, low pressure and vacuum steam heating systems. Direct electric, gas and unit heating systems. Domestic heating.

Ventilating systems : gravity, plenum and exhaust systems. Flow of air through ducts. Blowing and extract fans. Air heaters. Air filters. Air washers. General methods of air conditioning. Sound and vibration reducing devices.

Systems of hot water supply. Types and sizes of boilers, cylinders storage tanks, calorifiers. Electric and gas heaters.

Calculations and layout of schemes. Performance tests.

Fifth Year (Optional).

Study of heating units. Boilers, comparison of fuels. Automatic stokers and other systems of automatic fire control. Construction and design of flues, ducts and chimneys. Electrical thermal storage.

Calculations necessary in designing the principal units in the various standard heating systems. Heat losses and gains in a building. Pipe sizing. Lay-out including disposition of radiators and panels, and the planning of heating chambers. Methods of automatic control and record. Use of Kata thermometers and similar measuring devices. Performance tests.

Calculations necessary in designing the principal units in the various standard ventilating systems. Standards of ventilation. Combined heating and ventilating. Performance tests.

Introduction to the principles and practice of refrigeration. Toxic and non-toxic refrigerants. Domestic and large-scale refrigeration. Insulating material and methods.

* In order that the statement of the work may be complete, a number of elementary items appear in the early stages of both subjects. With well-qualified students these could no doubt be rapidly dealt with, or summarised in a revision of earlier work.

Introduction to the methods of district heating and to the features of large-scale heating installations.

8. STRUCTURAL PRACTICE AND DESIGN (See Section IX).

Fourth Year.

Revision of the preparatory work included in the Intermediate Course.

Mathematical determination of shear force, bending moment, slope and deflection diagrams for continuous girders : derivation of simple theorem of three moments.

Floor construction with steel girders. Effect of end restraint and continuity over supports.

Reinforced concrete beams ; beam and slab design in reinforced concrete ; shear reinforcement.

Design of built-up steel girders, plate girders, lattice girders. Riveted and welded connections.

Derivation of strut formulæ to allow for eccentricity of loading, initial crookedness, etc.

Design of steel stanchions and beam connections.

Reinforced concrete columns ; longitudinal and lateral reinforcement; spiral reinforcement, reinforced concrete footings, etc.

Foundation problems. Investigation and testing of sites. Introduction to application of soil mechanics to structural work. Foundation pressures. Piled foundations and rafts.

Masonry construction. Earth pressure on retaining walls—graphical constructions. Graphical methods of determining line of thrust in arches ; determination of horizontal thrust at supports ; shear force, bending moment and thrust at any section in the arch ring ; calculation of stresses ; investigation of stability.

Structural Practice. (To be treated also in the Building Construction and Studio classes.)

Detailing and fabrication of structural steelwork ; drawings, templates and fabrication. Reinforced concrete details and bending schedules. Supervision of construction ; formwork and steel fixing, placing of concrete, striking of formwork.

Treatment of large excavations and deep basements.

Shoring, needling and underpinning.

Experimental Work.

Laboratory work on materials and structures, including, if possible, tests to destruction on large size beams, struts, etc., complete record being taken of loads and deformations.

Fifth Year (Optional).

Moving loads on beams ; influence lines for shear, bending moment, etc. Conditions for maximum influence.

More difficult problems on continuous girders : derivation of general Theorem of Three Moments. Solutions by method of successive approximations ; moment distribution. Load distributions to give maximum mid-span and support moments. Factor of safety and load factor. Effect of beam and pillar continuity : application of moment distribution method of analysis to continuous building frames. Mechanical methods of analysis with models.

Treatment of steel and reinforced concrete frames. Design of steel and reinforced concrete stanchions for combined bending and direct thrust.

Design of reinforced concrete retaining walls.

Elastic theory of arches, and mechanical methods of analysis with cardboard or other models.

General consideration of the application of structural theory to specialised construction : tanks and silos, towers and gantries : bridges, etc.

Further work on design, structural practice, experimental work and testing.

APPENDIX II

Suggested Distribution of Instruction in Science and Technology in a Five-Year Full-Time Course

I. *Intermediate Course.* *Subject.*	Years. I	II	III	Total Teaching time (hours).
(1) Mathematics (see par. 70) .. *Scheme A* (see pars. 54 and 55).	x	x	(x)	200 to 250
(2) Building Science .. .. *Scheme B* (see par. 61).	x	x	x	300 to 450
(3) (*a*) *Science*—				
(i) Physics	x	x	—	200 to 300
(ii) Chemistry	x	x	—	
(*b*) *Co-ordination of Science with Technology* (see par. 61).				
(i) Elementary materials	x	x	x	150 to 200
(ii) Elementary Structures	x	x	x	
(iii) Elementary Equipment	x	x	x	

II. *Final Course.* (See Section IX)	Years. IV.	V.	
(4) Acoustics and Sound Insulation	(x)	—	50 to 80
(5) Electrical Equipment and Installation	(x)	—	50 to 80
(6) Hygiene and Sanitation ..	(x)	—	50 to 80
(7) Heating and Ventilating ..	x	(x)	100 to 150
(8) Structural Practice and Design	x	(x)	100 to 150

Notes :

(*a*) " x " indicates the years in which the subject is to be taken.

(*b*) " (x) " indicates that the subject is optional. Subjects (4), (5) and (6) might be taken either in Year IV or V as convenient.

(*c*) The total hours include the optional years.

(*d*) For a note on other types of courses than the five-year full-time course, see par. 72.

THE RECONSTRUCTION COMMITTEE'S PROGRAMME

The following programme of work has been accepted by the Reconstruction Committee, who have organised groups of committee members (each group having powers to co-opt.) to deal with the various subjects.

The terms of reference of the Reconstruction Committee are : " To consider and formulate the policy of the R.I.B.A. and Allied Societies on the subject of post-war reconstruction and planning in its widest aspect and to report to the R.I.B.A. Council."

The work suggested by these terms of reference can be divided as follows :

1. Analysis of the position of the architectural profession in relation to physical reconstruction.
2. Practical considerations in connection with reconstruction concerning which the Government may seek advice from the profession at any time.
3. Propaganda on broad lines to demonstrate to the public the immense opportunities underlying national reconstruction, and the part the profession can play in this work.

The work under these main headings can again be divided as set out below.

A small group has been formed to carry out the work under each of the sub-headings of 1 and 2, and that group has power to co-opt any person whom it considers necessary for the completion of the work in hand. These groups will record their findings in a concise report for submission to the main committee, with a view to publication as soon as possible. Wherever applicable groups will consider the immediate as well as the post-war aspect of their particular problems.

A policy group has been formed composed of the chairmen of each of the groups enumerated below.

The work under heading No. 3 will be covered by the Publicity Sub-Committee.

1. (*a*) *Professional Status Group :*

To consider the position of architects in relation to a National Planning Authority and its Regional and Local Administration, both as regards the actual planning work and as regards the supervision of building operations : to consider the part that architects in private practice can play through advisory boards, consultative panels, and the like, by reason of their relations with, and their knowledge of, the general public ; to consider the position of official architects and their status in public or Government services in relation to other professions ; and to report.

(b) *Town Planning Qualifications Group :*
To consider an architect's qualifications for town-planning in view of the probable shortage of qualified men after and during the war ; to consider the possibility of including town-planning in an architect's curriculum of education, either as a pre-graduate or post-graduate course, the possibility of organising short courses on town-planning for qualified architects now in practice or in official positions, and the possibility of demobilisation courses on town-planning for architects and students now in the armed forces ; and to report.

2. (a) *Planning and Amenities Group :*
To consider urban and rural amenities such as the relations between industry and population, and open spaces, schools, cinemas, public buildings, licensed premises, etc., and the social requirements of an agricultural community ; and to recommend appropriate standards.

(b) *Housing Group :*
To consider housing accommodation, both urban and rural, as regards planning, fittings, finishings, etc., and to recommend appropriate standards.

(c) *Building Legislation Group :*
To consider contemporary (town-) planning and building legislation, byelaws, etc., as regards their effects on construction, design and amenities ; to consider desirable revisions, and to report.

(d) *Building Industry Group :*
To consider the capacity of the building industry to undertake reconstruction both as regards men and materials ; to consider present methods of tendering for, and the placing of, work in relation to the fact that, during reconstruction, demand will probably exceed supply ; to consider building finance as applied to reconstruction, and to report.

(e) *Building Technique Group :*
To consider building science and technique with a view to the probable shortage of certain building materials ; to consider the possibilities of standardisation, pre-fabrication and the use of synthetic materials ; and to report.

3. *Publicity Sub-Committee :*
The terms of reference of the Publicity Sub-Committee are : "Generally to further public interest in the work of the architectural profession, and in particular to spread the views of the R.I.B.A. on reconstruction."

The Committee stresses that wherever possible groups should concentrate on co-ordinating existing information rather than initiating new research, as it is considered that a great deal of the work suggested is being, or has already been, covered by other committees either inside or outside the Institute, and it is felt that the quick publication of reports is essential.

It is suggested that each group should submit a preliminary report within six weeks, and that thereafter progress reports should be submitted at monthly intervals.

THE EXHIBITION OF LONDON MAPS

The Exhibition of London Maps, which is illustrated by a general view on the first page of this JOURNAL, has been a great success and on each day, including Saturday afternoons and Whit Monday, has attracted large numbers into the R.I.B.A. building.

The exhibition has been planned to show the growth of London during the last four centuries, to illustrate not only continuity of development and the manner in which many of the ancient features of the plan and buildings of the city have been maintained but also the very great complexity of the problem that faces those who are charged now with the task of devising new plans for London and organising and executing work of reconstruction.

Among the most important sections of the exhibition is the last in the chronological series, in which, through the courtesy of the London County Council, it has been possible to include a large number of survey plans prepared by the County Council's Town Planning Department.

The Sixteenth Century

Two plans are shown in this section, the first of them being Ralph Agas's semi-pictorial plan of London in about 1560. At this time Westminster existed only as a small group of buildings round the Abbey and Court buildings on the riverside. The centre of the City proper then, as now, was in the area between St. Paul's Cathedral and the Tower of London, and no part of the town was more than a few minutes' walk from the open countryside.

The Seventeenth Century

Two of the most interesting exhibits here are the panorama made in 1616 by C. J. Visscher, showing the whole extent of London from Whitehall to the Tower, and in 1647 by Wenceslaus Hollar. Hollar's engraving is one of the finest pictures that have ever been made of any city in the world.

Two large plans show the growth of accuracy in topographical draughtsmanship. In between Faithorne's plan of 1658 and Morden and Lea's plan of 1682 is a group which includes a reproduction of Wren's plan for the City after the Great Fire, the extent of which is shown by another Hollar engraving in which the wound left by the Fire is shown clearly. In this section there is a plan prepared by the London County Council superimposing the Wren plan on the top of the actual street plan as it is to-day. The vision of the Wren plan stands on the screen between Faithorne's plan before the Fire and Morden and Lea's after. The structure and detail of the buildings have changed, stone and brick and classic for timber and brick and gothic, but the plan, the essential framework of the metropolis, is the same after as before.

The Eighteenth Century

The earliest eighteenth-century plan is the great plan by Rocque, 1746. By this time there had been considerable extension of the City beyond the earlier limits which it had reached in the seventeenth century. It illustrates the failure of the many attempts that had been made in the sixteenth century, both before and after the Fire, to limit the boundary of London.

Kip's view, 1710, is a panorama from a site approximately above the present Buckingham Palace looking towards the City. In this can be seen the preponderantly renaissance character of building in the Westminster area. Another small plan adjacent to this, made towards the end of the century, shows the complicated street plan in the neighbourhood of Westminster Abbey and the new Westminster Bridge.

A panorama of a different type is the 13-ft. view, engraved by S. & N. Buck in 1749, taken from the Surrey side and showing London between Westminster and the Tower.

The beautifully engraved map by W. Faden, of 1790, showing London and the country for 25 miles round, gives a clear picture of its isolation in the middle of open country and the detachment from the centre of such suburbs as Hampstead, Kensington, Chelsea, Camberwell, etc., which are now all linked to the main body of the City and are themselves enclosed by miles of development on the outer fringes.

The Nineteenth Century

The nineteenth-century group opens with another edition of Faden's map of 25 miles round London, showing the few developments that had taken place in the years between 1790 and 1802. The chief interest in this section is Cruchley's map shown in a dated edition of 1835 and an undated edition about 20 years later. In the first, courses of the proposed railways are shown ; in the second the railways are there and the scene is set for the railway-engendered slum.

This section also includes a small selection from the many hundreds of street widening and street improvement schemes. Those chosen illustrate the development of Holborn, Farringdon Road, Westminster and Victoria, and some schemes for the Embankment.

Two naïve panorama by George C. Leighton show the popular interest in London.

THE TWENTIETH CENTURY

The first maps in this group come from the London County Council Town Planning Department. They are examples only of many thousands of similar maps compiled by the L.C.C. in the course of their routine work maintaining and improving the face of London. The first show the geology and contours; the next lot show the survey of buildings, illustrating their use for domestic, commercial, industrial and communal services. Included are two very carefully compiled plans showing the draft zoning scheme for building use and for the regulation of the heights of buildings in Battersea.

Other maps in the twentieth-century section show London population density, the surface use of the land for parks, market gardening, domestic gardens, and so on, over an area from Hoddesdon in the north to Redhill in the south, from Maidenhead to Gravesend: these were prepared by the Land Utilisation Survey of the London School of Economics; the Ministry of Transport Highway Development Survey, prepared by Sir Charles Bressey and Sir Edwin Lutyens, as well as plans from the Greater London Regional Survey, prepared by Sir Raymond Unwin.

The nineteenth and twentieth centuries are bridged by the surveys of London poverty compiled in 1889 by Charles Booth and in the last few years by the New Life and Labour Survey of the London School of Economics.

As an instance of the careful watch that has been maintained on the specialist aspect of London's growth by the Housing Centre, the exhibition includes a large map made by the Housing Centre, showing all housing development in London in the past 20 years, and as an example of a notable private venture in planning London's development there is the scheme proposed by the London Society as a result of survey work carried out during the last war.

The period of the exhibition has been extended and it will now remain open until 6 p.m. on Thursday, 26 June. The exhibition will also be open on Saturday afternoons.

Notes

THE WAR DAMAGE ACT 1941 AND INSURANCE OF ARCHITECTS' DRAWINGS

Several members have enquired whether architects' drawings and plans are insurable under Part II of the War Damage Act. An official ruling has now been received from the Board of Trade that architectural plans and drawings are regarded as "documents owned for the purpose of a business" under section 95 of the Act and are therefore not insurable. This being so, members are recommended to inform their clients that drawings in the architect's possession are not insurable by the architect under the Act and to enquire whether the client wishes the drawings to be delivered to him or whether he will leave them in the architect's custody at his, the client's, risk.

APPOINTMENTS OPEN

There is a vacancy on the staff of the Northern Polytechnic School of Architecture, Surveying and Building for a temporary part-time or full-time teacher. Applicants should be of British birth and over military age or otherwise exempt. Some previous teaching experience is desirable. The teacher appointed will be allowed to continue private practice. Applicants should write to the Head of the Department, Mr. T. E. Scott [*F.*], Northern Polytechnic, Holloway, London, N.7.

ISLE OF ELY COUNTY COUNCIL

ARCHITECT'S DEPARTMENT

Amended Advertisement

Applications are invited for the temporary appointment of a Senior Architectural Assistant. Candidates must have a thorough knowledge of architectural practice and the building trades, and be competent to handle works under supervision.

The salary will be at the rate of £400 per annum, plus war bonus, which is now £35 per annum.

The appointment is for a period not exceeding two years, and will be subject to two months' notice on either side and the Council's Staff Regulations.

The candidate appointed will be required to pass a medical examination.

Canvassing in any form will disqualify, and candidates must disclose in writing whether to their knowledge they are related to any member or holder of senior office under the Council.

Applications giving age, qualifications and experience, accompanied by copies of three recent testimonials, should be sent to the County Architect, County Hall, March, not later than 14 July 1941.

R.I.B.A. EXAMINATION FOR THE OFFICE OF BUILDING SURVEYOR UNDER LOCAL AUTHORITIES

At the R.I.B.A. Examination for the office of Building Surveyor under Local Authorities held on 7, 8 and 9 May 1941, three candidates presented themselves and the following were successful:—Mr. C. Llewellyn Jones and Mr. Clifford Oates.

Book Review

ARCHITECTS AND CAMOUFLAGE

THE ART OF CAMOUFLAGE. *By Lt.-Col. C. H. R. Chesney, D.S.O. 8vo. 252 pp.+13 pl. 1941. Robert Hale. 8s. 6d.*

The publication of Col. Chesney's book is of particular importance at the present time for he had very extensive practical experience of camouflage in the field in the last war, therefore the conclusions which he draws are of vital consequence to us now.

It should be said at once that the main conclusion of the book is that camouflage is primarily a job for the architect. It is true that Col. Chesney, being an R.E., politely adds "engineer" to "architect" now and again, but the main thesis of the book shows that camouflage is not necessarily something to do with paint, and that the successful camoufleur *must* have had training in those very subjects found in the curriculum of all the architectural schools and not found fully under any other training.

The strong and consistent policy of the R.I.B.A. with regard to camouflage, in continuously urging on the Government the special qualifications of architects for this work, has already been fully vindicated by the publication of the Fourteenth Report of the Select Committee on National Expenditure—but this book would now serve as a corollary to the R.I.B.A. policy if one were needed.

The teaching of Col. Chesney is right—very right; the book is of interest throughout and one hopes that it will be widely read, but one is shocked to find that it was written before this war started, and presumably it is this fact that has allowed the author to give himself the pleasure of giving a personal account of his experiences of camouflage, rather than producing a book to satisfy one of the nation's immediate crying needs. As we happen to be in the middle of the greatest war of all time, what a pity it is that Col. Chesney and his publishers have not seized their opportunity to give us a clear and authoritative work on this subject.

The Art of Camouflage consists of several different parts: first, four good clear chapters on camouflage in Nature—methods of imitation disruption, and the like, by J. Huddlestone; secondly, the main corpus of the book, being an account of camouflage in the field (France 1914-18) and civil and military camouflage now and in the future; thirdly, "strategic camouflage," being stories of Napoleon, Stonewall Jackson and the Boers; and, lastly, the Memorandum prepared by C. G. Agate (president of the Manchester Society of Architects) and put forward by the R.I.B.A. Col. Chesney strongly approves this Memorandum and adds points to its conclusions.

This so English book is enjoyable, but it is primarily a book for those who already know, for though the facts are there, they are so loosely put together that the vital points will almost certainly escape even the most enthusiastic young officers in search for knowledge of practical camouflage. Just because Col. Chesney's writing is not direct and concise, one feels that we shall still use, for instance, gun positions

where the gunners think they are hidden because they themselves cannot see the planes above, though they expose their square man-made shapes and their tracks for all air enemies to see ; moreover, one feels that, because of this discursive writing, we shall waste much of the knowledge we so expensively gained in the last war for the necessity to reduce the form and tone of our object to the pattern of the neighbourhood, whether that pattern be natural or man-made.

But in spite of criticisms, this book is recommended to all those who have in any way to deal with the camouflage problem. It clearly points out the danger of the popular misconception that camouflage is solely the work for the painter, whereas, to those who know, it is evident that paint is but one of the means towards some types of successful camouflage : it emphasises the vital importance of the siting and planning of buildings from the point of view of camouflage : it stresses the extreme value of texture and it raises some interesting views with regard to smoke. Yet one can only conclude by expressing the strong hope that Col. Chesney has already on the stocks a clear, urgent and succinct Handbook on Camouflage (with good diagrams and an index) taken not from his personal reminiscences but from the fulness of his knowledge.

EDWARD MAUFE

Accessions to the Library

1940-41—II, *concluded*

UNWIN COLLECTION, *contd.*

BUILDING TYPES (DOMESTIC), *contd.*

728.67 (436/439)
ÖSTERREICHISCHE INGENIEUR- UND ARCHITEKTEN-VEREIN
Das Bauernhaus in Österreich-Ungarn.
Atlas [plates]. pfo. fo. Dresden. (parts, 1901-06) [1906 or after].

LORENZEN (VILH.), *editor* 728.68 (489)
Tegninger til husmandsboliger [drawings of cottages]. (Landbrugsministeriet.)
ob. 10″×15½″. Odense. 1909.

WENTSCHER (A.) 728.86
Das Landhaus. (Velhagen & Klasings Volksbücher, No. 57.)
la. 8o. Bielefeld & Leipzig. n.d.

DETAILS

729.3.033.4/5 (43)
REICHENSPERGER (A.), STATZ (V.) *and* UNGEWITTER (G.)
*The Gothic model-book. The architecture of the middle ages, *etc.* Trans. by — Monicke.
fo. Lond. [18—.] *To Loan Library.*

GATTINONI (GREGORIO) (*called* ROSOLINO) 729.365 (45 V)
Historia di la magna torre dicta campaniel di San Marco [Venice] *etc.* (Il Campanile di San Marco. Monografia storica, *half title.* Magnæ turris Sancti Marci *etc, cover title.*)
12¼″. Venice. 1910.
No. 72 of a limited edition.

ALLIED ARTS

WHITE (JOHN P.), *firm, of Bedford* 749.036 (42)
Furniture made at the Pyghtle Works, Bedford, by J— P. W—, designed by M. H. Baillie Scott.
11¾″. n.p. [19—.]

TOPOGRAPHY

WARREN (W. T.) 91 (42.27 W)
Winchester illustrated.
8o. Winchester. 1905.

O'LEARY (J. G.) 91 (42.67 D) : 711.58
The Book of Dagenham. (Dagenham Urban District Council.)
9¾″. Dagenham. 1937.

[MAYREDER (KARL)] 91 (436 V)
Wien und umgebung. *Etc.* (Vienna : Municipality.) Martin Gerlach, phot.
ob. 8o. [Vienna. 1912.]

CEKOTA (A.) 91 (437 Z) + 725.4 (437 Z)
*Zlin. The place of activity. (Phots. by Jos. Vanhara. Graphic arrangement . . . by S. Tusar.)
9″. [Zlin. 1936.] *To Loan Library.*

TOWN PLANNING, GARDENS

SITTE (CAMILLE) 711.4
Der Städte-bau. 1889.
**French trans.* L'Art de bâtir les villes . . . Camille Martin, trans. and completed.
9″. Geneva & Paris. 1902. *To Loan Library.*

UNWIN (RAYMOND) 711.4
Town planning in practice.
German trans. Grundlagen des städtebaus. Eine anleitung *etc.* Trans. by L. MacLean.
Ergänzungen [suppts.] *only.*
9½″. Berlin. 1930.

GIOVANNONI (GUSTAVO) 711.4
Vecchie città ed edilizia nuova. (Collana di urbanistica *series,* i.)
10¼″. Turin. 1931.

BRINCKMANN (A. E.) 711.4.01
*Platz und monument.
9″. Berlin. 1908. *To Loan Library.*

UNITED STATES : FEDERAL HOUSING ADMINISTRATION 711.58
*Planning neighborhoods for small houses. (Technical bulletin No. 5.)
pam. 9¼″. Washington : Govt. Printing Office. 1936. *To Loan Library.*

711.585 (73 NY) : 912
NEW YORK *city* : SLUM CLEARANCE COMMITTEE
Maps and charts prepared . . . 1933-34 together with maps and charts of the Land Utilization Committee of the New York Building Congress *etc.*
ob. 11″×17″. New York. [1934.]

JANSON (A.) 712.22 : 728
Der Hausgarten. (Velhagen & Klasings Volksbücher, No. 85.)
la. 8o. Bielefeld & Leipzig. n.d.

Membership Lists

ELECTION : MAY 1941

The following candidates for membership were elected in May 1941.

AS FELLOWS (7)

CLARK : HERBERT HENRY [*A.* 1935].
COIA : JACK ANTONIO (Dip. Arch.) [*A.* 1924], Glasgow.
DAVIDSON : ALEXANDER JOHN, F.S.I., M.T.P.I. [*A.* 1928], Douglas, Isle of Man.
HELLBERG : ROLF [*A.* 1932], Coventry.
HOAR : HAROLD FRANK, B.A., A.M.T.P.I. [*A.* 1931].
SNAILUM : TERENCE WALTER, A.A.Dip. [*A.* 1926], Trowbridge.
WARD : BASIL ROBERT [*A.* 1928].

AS ASSOCIATES (15)

BEACHER : CECIL ARTHUR GRENVILLE, Barnsley.
BERNEAUD : HENRY CHARLES, Edinburgh.
BROWN : BERNARD JOHN, B.A. (Hons., Cantab.).
COOPER : GEORGE STANLEY, Doncaster.
COOPER : SIDNEY ERNEST, Shrewsbury.
GILBERT : JACK GODFREY.
HAMP : MISS CHRISTIAN MARY, Beaconsfield.
LITTLE : MAURICE EDGAR, Manchester.
LITTLEFAIR : MISS HONORA MARGARET, Nottingham.
McKENZIE : JAMES GEORGE, Clydebank.
MAKINS : MISS MARGARET FINDLAY, Rhyl.
MANASSEH : LEONARD SULLA.
MOORE : ROBERT ISAAC.
THOMPSON : ROBERT GREY, Newcastle-upon-Tyne.
WRITER : AARON.

AS LICENTIATES (10)

BRUCE : ROBERT MALCOLM, Newcastle-on-Tyne.
BUTLER : EDWARD CHARLES.
COLBOURN : GEORGE BROWNRIGG.
DIVES : CYRIL BAZLEY, P.A.S.I.
FEAR : MAJOR JOHN LAURENCE, F.S.I.
LANE : ERNEST GEORGES.
POWELL : PERCY MAGNUS.
ROWLES : DOUGLAS LAWRENCE.
SINGER : JACK LOUIS, Cheltenham.
TYRRELL : JOHN EDWARD.

ELECTION : JUNE 1941

The following candidates for membership were elected in June 1941.

AS FELLOWS (6)

Daniel : Thomas Llewelyn [*A.* 1918].
Haughan : John Holliday [*A.* 1922], Carlisle.
Lewis : Ernest Wamsley [*A.* 1926], Weymouth.
Nunn : John Price [*A.* 1923], Manchester.
And the following Licentiates who are qualified under Section IV, Clause 4 (*c*) (ii) of the Supplemental Charter of 1925 :
Benz : Frederick Charles, Eastbourne.
Crawford, Douglas, Bishop Auckland.

AS ASSOCIATES (10)

Beecroft : Cecil Ivan, Sleaford.
Betts : Douglas William, Nottingham.
Charlton : Percival Robert, Liverpool.
Eyre : Reginald, Belper.
Gatley : Geoffrey Higson, York.
Gorst : Henry, B.Arch., Preston.
Holmes : Leonard, Belper.
Leggatt : Richard Walter, Weymouth.
Treadgold : Paul Henry, A.A.Dipl.
Willis : Graham, Sheffield.

AS LICENTIATES (6)

Crellin : Ewart, York.
Johnson : Frederick Arthur.
Kelsey : Alfred Edward.
Lambert : Herbert George, Bournemouth.
Reid : Alexander Budge.
Robinson : Eustace James McAdam, Sheffield.

ELECTION : JULY 1941

An election of candidates for membership will take place in July 1941. The names and addresses of the candidates, with the names of their proposers, found by the Council to be eligible and qualified in accordance with the Charter and Byelaws are herewith published for the information of members. Notice of any objection or any other communication respecting them must be sent to the Secretary R.I.B.A. not later than Thursday, 3 July.

The names following the applicant's address are those of his proposers.

AS FELLOWS (2)

Halliday : Franklyn Leslie, A.M.T.P.I. [*A.* 1923], 14 John Dalton Street, Manchester : Mottram Gate, Withinlee Road, Prestbury, Cheshire. Prof. R. A. Cordingley, H. Worthington, C. G. Agate.

Knott : Arthur John [*A.* 1920], 28 Orchard Street, Bristol ; 46 Redland Court Road, Bristol. J. R. Edwards, C. F. W. Dening, E. H. Button.

AS ASSOCIATES (6)

The name of a school, or schools, after a candidate's name indicates the passing of a recognised course.

Board : Robert Willett Vyvyan, B.Arch.(Hons.)L'pool [Univ. of L'pool], c/o A. V. Board, Esq., Abbey Road, West Kirby, Cheshire. Prof. L. Budden, H. Thearle, J. E. Marshall.

Curtis : Miss Hilary [Edinburgh College of Art], 26 Hillway, N.6. A. A. Foote, F. C. Mears, J. Wilson.

Desyllas : Leo Messenesos [A.A.], The Studio, Whiteleaf, near Aylesbury, Bucks. R. F. Jordan, B. Ward, C. A. Lucas.

Harper : Dennis Rossyln [Birmingham School], 191 Corporation Street, Birmingham. G. Drysdale, H. Jackson, T. M. Ashford.

Madge : John Hylton [Cambridge Univ. and the A.A.]. The Studio, Whiteleaf, near Aylesbury, Bucks. B. Ward, C. A. Lucas. G. A. Jellicoe.

Steer : Oliver Edwin [Final], 16 Clarence Road, Sidcup, Kent. H. Robertson, J. M. Easton, J. Addison.

AS LICENTIATES (16)

Appleyard : Leslie Taylor, Leeds City Engineer's Dept., Civic Hall, Leeds, 1 ; "Broadlands," Thorpe Lane, Guiseley, Yorks. G. W. Atkinson, F. L. Charlton, P. Robinson.

Croft : Reginald Edward, c/o Messrs. Howard & Souster, 81 Piccadilly, W.1 ; "The Chimes," Dalkeith Avenue, Old Bilton, Rugby. E. G. W. Souster and applying for nomination by the Council under Byelaw 3 (*d*).

Green : Frank, c/o C. Castelow, Esq., 10 Park Row, Leeds ; "Foursquare," Dawcross, Burn Bridge, near Harrogate. G. W. Atkinson, J. E. Shaw, J. E. Stocks.

Green : Leslie Bernard, 40 Craven Street, Strand, W.C.2 ; 17 Prior Avenue, Sutton, Surrey. G. Coles, C. Masey, Lt.-Col. B. C. Page.

Joseph : Charles Sampson, 10 Lowndes Square, S.W.1. H. A. Hall, S. Tatchell, T. S. Tait.

Kettle : Alan, Town Hall, Fulham, S.W.6 : 41 Edith Road, West Kensington, W.14. M. J. Dawson, F. T. Dear, G. T. Mullins.

Lewis : Glyn Thomas, Borough Engineer's Dept., Town Hall, Kensington, W.8 ; 14 Queen's Gate Terrace, S.W.7. B. George A. S. Roberts, and applying for nomination by the Council under Byelaw 3 (*d*).

Ludford : Cyril, 15 Torrington Square, W.C.1 ; 22 Langham Gardens, North Wembley, Middlesex. C. Holden, L. G. Pearson, W. H. Cowlishaw.

McAdam : Bernard Joseph, "Charlcott," Trumpsgreen Road, Virginia Water, Surrey. W. H. Ansell, L. G. Pearson, J. W. Spink.

McCallum, William Robertson, c/o Technical Section, Public Health Dept., Town Hall, Manchester ; 126 Brantingham Road, Manchester. Applying for nomination by the Council under Byelaw 3 (*d*).

Palmer : Percy Tom, Borough Engineer and Surveyor's Department, Metropolitan Borough of Stepney ; 95 Langthorne Street, Fulham, S.W.6. B. W. Stuttle, B. J. Belsher, B. W. H. Scott.

Pettengell : Edward Eric, 8 Hillside Road, S.W.2 ; 26 Muschamp Road, S.E.15. E. G. W. Souster, Lt.-Col. H. P. Cart de Lafontaine, H. Lidbetter.

Redmond : Ivor Kyle, 2 Vicarage Gate, Kensington, W.8. H. Lidbetter, T. Wallis, T. S. Tait.

Rudling : William Atkins, c/o Sir Charles A. Nicholson, 2 New Square, W.C.2 ; 30 West Street, Prittlewell, Essex. Sir Charles Nicholson, T. J. Rushton, D. H. Burles.

Trobridge : Hubert Frank, War Office, Whitehall, S.W.1 ; 2 Temple Grove, Golders Green, N.W.11. Wm. A. Ross, V. J. Esch and applying for nomination by the Council under Byelaw 3 (*d*).

Tucker : Henry Parkes, Metropolitan Borough of Stepney, Camperdown House, Half Moon Passage, Aldgate, E. ; 267 Halfway Street, Sidcup, Kent. B. W. Stuttle, B. J. Belsher, T. E. Scott.

MEMBERS' COLUMN

CHANGES OF ADDRESS

Sydney Tatchell & Son (Sydney Tatchell [*F.*] and Rodney F. Tatchell [*A.*]) as a result of war damage have moved their offices to Cliffords Inn, Fleet Street, E.C.4 (Tel. : Holborn 8434).

Messrs. Lionel H. Fewster & Partners wish to announce that they have opened new offices at 31 Dorset House, Gloucester Place, London, N.W.1 (Tel. : Welbeck 2908/9).

Messrs. Bethell & Swannell have moved to Victoria House, Vernon Place, Southampton Row, W.C.1 (Tel. : Holborn 1503).

For the duration of the war, the practices of C. J. Eprile [*F.*] and R. J. Hurst [*A.*] (Dowton & Hersch) are amalgamated, and the address of the combined practice is 11 Grosvenor Court Mansions, W.2 (Tel. : Paddington 3556).

Messrs. E. F. S. Biram [*F.*] & L. B. Fletcher [*A.*] have changed their address for the duration of the war to 78 St. Helens Road, Rainford, Lancs (Tel. : Rainford 269).

Messrs. Campbell, Honeyburne & Sumner [*F.A.A.*], of Liverpool, have changed their office address to 9 Manchester Road, Southport.

Owing to enemy action, Building Industries Services, Ltd., The Clay Products Technical Bureau of Great Britain, Ltd., and Oscar Bayne [*A.*] and Cotterell Butler [*A.*] (London office) have removed to 115 Ebury Street, S.W.1 (opposite to their old offices). The telephone number remains as before, Sloane 9801.

OFFICES TO LET

F.R.I.B.A. wishes to let suite of offices consisting of Drawing Office, Private Office, and well-lit Store Room, adjacent to Storey's Gate, Westminster. An additional room on floor over could be had if required. Low rent.—Reply Box 1441, c/o Secretary R.I.B.A.

EMPLOYMENT

Assistance given in own office by Fellow to members requiring same, —Box 1161, c/o Secretary R.I.B.A.

Associate (not liable to military service for medical reasons) seeks teaching post in Architectural School or Art School where architectural subjects are taught. Full or part time, London area or Home counties preferred.—Box No. 1461, c/o Secretary R.I.B.A.

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